

Mental Math

Grade 9 Mathematics

Mental Math

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This resource is also available on the Manitoba Education and Advanced Learning website at www.edu.gov.mb.ca/k12/cur/math/supports.html.

Disponible en français.

Available in alternate formats upon request.

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Introduction

INTRODUCTION

Mental Math: Grade 9 Mathematics is a complement to the Grade 9 Mathematics curriculum and is intended to help students develop strategies that allow them to perform mental calculations.

Why Mental Mathematics?

Mental mathematics and estimation is one of the seven processes of the mathematics curriculum.

Mental mathematics and estimation is a combination of cognitive strategies that enhance flexible thinking and number sense. It involves using strategies to perform mental calculations.

Mental mathematics enables students to determine answers without paper and pencil. It improves computational fluency by developing efficiency, accuracy, and flexibility in reasoning and calculating.*

It is used by individuals in their daily lives at home and at work. Mental calculation requires students to call on their knowledge of numbers and mathematical operations. It not only calls on memory but helps improve it as well.

Mental calculation is at the root of the estimation process. It allows us to determine whether results obtained with a calculator are reasonable.

Estimation is used for determining approximate values or quantities, usually by referring to benchmarks or referents, or for determining the reasonableness of calculated values. Estimation is also used to make mathematical judgments and to develop useful, efficient strategies for dealing with situations in daily life.*

Mental calculation is an important way of developing number sense and acquiring a better understanding of place value and mathematical operations. Students who have experience with mental math develop the ability to work with numbers. Mental calculation can be used to prepare for written work by providing an approximate answer to a problem. Using certain mental calculation strategies can eliminate some steps in written calculations and help simplify the process. In short, mental calculation skills are at the heart of numeracy.

* Manitoba Education and Advanced Learning. *Grades 9 to 12 Mathematics: Manitoba Curriculum Framework of Outcomes, 2014* (Winnipeg, MB: Manitoba Education and Advanced Learning, 2014) 9.

Mental calculation is used almost daily in life. We often have to do quick mental calculations at times when we do not have paper, a pencil, or a calculator handy. Mental calculation is therefore a very practical skill. Teachers should provide opportunities for their students to use mental math and estimation on a daily basis. They should encourage their students to find examples of the usefulness of mental calculation in their lives, such as when shopping, doing home renovations, estimating mileage, or working at their jobs.

Strategies

Teachers should promote a variety of mental mathematics strategies. They are encouraged to make students aware of the strategies described in the Strategies section of this document. The strategies that are most effective for mental calculation are often not the same strategies that are most effective for written calculation. Most students are able to develop strong mental calculation techniques, but often need help in doing so. Students may discover and use some mental calculation techniques by themselves but need to be taught other techniques to increase their mental calculation effectiveness. Regular mental calculation activities should be included in all mathematics curricula at all grade levels.

Document Features

The document includes three main sections: this introduction, a section describing strategies, and a series of mental mathematics questions organized by units.

The teacher will find mental mathematics questions relating to a specific strand of Grade 9 Mathematics as written in *Grades 9 to 12 Mathematics: Manitoba Curriculum Framework of Outcomes*. The *Mental Math: Grade 9 Mathematics* document consists of eight (8) units related to specific strands and one unit with a review of all strands:

Unit	Number of Pages
A: Number	13
B: Patterns	6
C: Variables and Equations	16
D: Measurement	6
E: 3-D Objects and 2-D Shapes	6
F: Transformations	7
G: Data Analysis	9
H: Chance and Uncertainty	6
I: Review (All Units)	20

The units may be taught in a different order as determined by the teacher. Every unit consists of several pages of mental math questions.

The unit of study is identified on each page. The questions on each page are divided into three different categories: six (6) general or review questions; four (4) questions related to the unit of study; and two (2) blanks for teachers to insert their own questions.

The answers to the questions are provided in the column on the extreme right-hand side of each page. Sometimes students are asked to provide the one right answer and at other times they are to provide an estimate where a range of values would be correct.

Teachers may want to prepare additional questions to better meet the needs of their students. A section at the bottom of each page entitled Other Questions has been set aside for this purpose. A blank template is also provided in a section titled Reproducible Sheets. Teachers may use it to prepare additional question sheets.

A file in Word format is available in the Mathematics Group on the Maple (Manitoba Professional Learning Environment) site at www.mapleforem.ca. The Word file does not contain the Strategies section of this document but it does contain the section with the Mental Math Questions by Unit. It is provided to enable teachers to add or modify questions to suit the needs of their students.

Immediately following this introduction is a section describing mental calculation strategies along with examples. Some students may already have an inventory of strategies that they can apply; others may not. Teachers can use the strategies information given in this document to help students expand their strategy knowledge.

Methodology

Given their usefulness, mental calculation exercises should be short and done frequently.

They should be short because they require sustained concentration. For example, the first five minutes or so of math class could be devoted to mental calculation exercises. This practice would also serve as a warm-up to the day's lesson. In addition, although mental calculation should be done within a certain period of time, it is preferable not to emphasize speed. Although speed is a factor, it is not a primary goal. It is obviously important to ensure that time spent on mental mathematics activities does not infringe on the time needed for instruction and other learning activities.

Establishing routines in the classroom also encourages students to get to work quickly at the beginning of each class. Teachers could establish a process such as the following:

- As soon as students arrive at the beginning of the class, they can take out a sheet of paper and write down the numbers 1 to 10 if there are 10 questions.
- The teacher can project a mental math page, present questions orally, or distribute a page with written questions.
- The students are given time to answer the questions.
- If students are unable to find an answer to a specific question, they could leave an empty space on that question and go on to the next question. The goal is accuracy and the development of a bank of effective strategies.
- The teacher should, on occasion, spend time discussing various strategies used by the students for one or more of the questions.

To ensure students gain confidence with a new strategy, it is important that they are given adequate opportunity to practise it. It is up to the teacher to provide an adequate number of exercises or problems to ensure that students are able to use the new strategies.

Assessment

Primarily, mental calculation exercises are used as assessment *for* learning. Mental calculation exercises should be done in a classroom environment in which students feel comfortable taking risks without being penalized when they make mistakes. However, teachers should ask students to do a self-evaluation by identifying the questions they had the most difficulty with or those they did not answer correctly. Periodically, teachers may choose to use the mental mathematics questions as assessment *of* learning by asking them to explain the strategy they used for a specific question or questions.

Mental calculation can allow students an opportunity to develop a better understanding of some mathematical concepts. Consequently, mental calculation activities should include periods for thought and discussion. During these periods, the teacher should encourage students to

- suggest a variety of possible correct solutions to the same problem
- explain the different methods used to come to the correct answer and their effectiveness
- explain the thought process that led to an incorrect answer

This type of discussion is very important in learning mental calculation strategies, because it is an effective way for students to present their thinking. Questioning, reflecting, and discussing, which are integral to the activities of mental calculation, are excellent ways of communicating mathematical ideas. This communication requires that students be clear and concise when explaining their thinking to others. It is often when students describe the strategy they used to solve questions that other students discover a new technique. These exchanges about the strategies as well as the results will allow the teacher to identify the difficulties encountered by some students. Subsequently, the teacher can help students discover new, relevant, useful, and important strategies.

Enjoy the mental mathematics experience!

Notes



Reproducible Sheets

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Unit:

Specific Learning Outcome:

General Questions

Answers

1.

2.

3.

4.

5.

6.

Unit Questions

7.

8.

9.

10.

Other Questions

11.

12.

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Unit:

Specific Learning Outcome:

General Questions or Review that Relates to the SLO

Answers

1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

Other Questions

11.	
12.	



Examples of Strategies

Mental Math

Grade 9 Mathematics (10F)

S-1

Sample Strategies

Begin adding from the left

When you do addition questions using paper and pencil, you usually start from the right and work toward the left.



To do addition in your head, start from the left.

EXAMPLE 1

$$\begin{array}{r} 46 \\ + 38 \\ \hline \end{array}$$

$$40 + 30 = 70$$

$$6 + 8 = 14$$

$$70 + 14 = 84$$

EXAMPLE 2

$$\begin{array}{r} 25.6 \\ + 13.7 \\ \hline \end{array}$$

$$20 + 10 = 30$$

$$5 + 3 = 8$$

$$\frac{6}{10} + \frac{7}{10} = 1 \text{ and } \frac{3}{10}$$

$$30 + 8 + 1\frac{3}{10} = 39.3$$

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Grade 9 Mathematics (10F)

S-2

Sample Strategies

Break down numbers and add their parts

Here's another way of doing addition in your head.

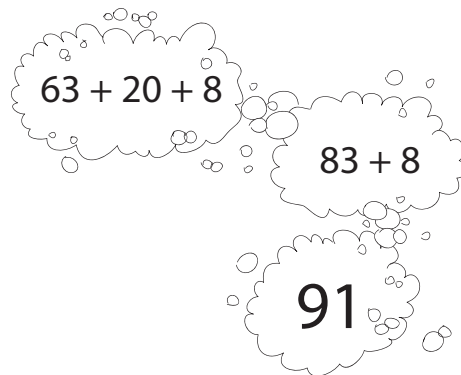
$$\begin{array}{r} 63 \\ + 28 \\ \hline \end{array}$$



Break down the numbers, then add their parts.

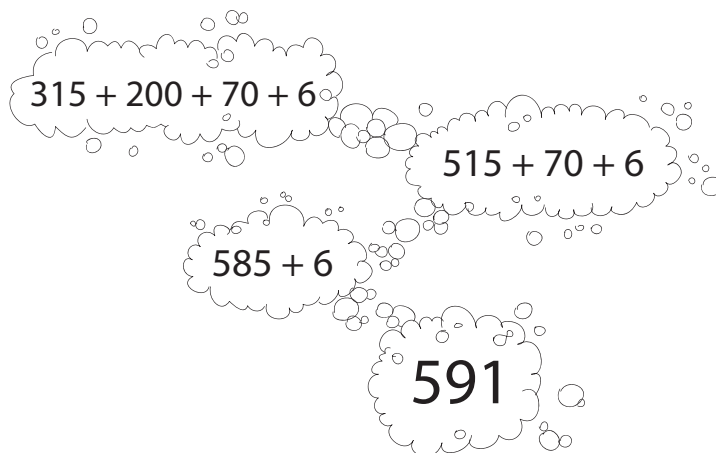
EXAMPLE
1

$$\begin{array}{r} 63 \\ + 28 \\ \hline \end{array}$$



EXAMPLE
2

$$\begin{array}{r} 315 \\ + 276 \\ \hline \end{array}$$



Mental Math

Grade 9 Mathematics (10F)

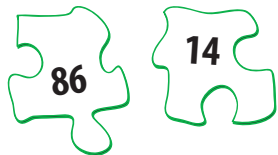
S-3

Sample Strategies

Finding compatible numbers

Compatible numbers are pairs of numbers that are easy to add in your head.

The following are examples of compatible numbers:



The sum equals 100



The sum equals 600



Find the pairs of compatible numbers that add up to 300.

140

85

160

118

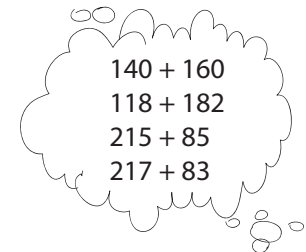
217

73

215

182

83



Find the pairs of compatible numbers that add up to 800.

250

175

567

333

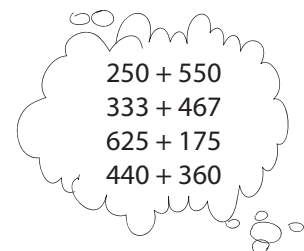
440

467

625

550

360



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S-4

Sample Strategies

Create your own compatible numbers



Sometimes it is easier to do addition in your head by creating your own compatible numbers and adjusting the total.

EXAMPLE
1

$$\begin{array}{r} 650 \\ + 375 \\ \hline \end{array}$$

$$650 + 350 + 25$$

$$1000 + 25$$

1025

EXAMPLE
2

$$\begin{array}{r} 1250 \\ + 753 \\ \hline \end{array}$$

$$1250 + 750 + 3$$

$$2000 + 3$$

2003

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S-5

Sample Strategies

Subtract starting from the left

Here's a technique that works well when doing subtraction questions that do not require grouping.



To do subtraction in your head, start from the left and think of your answer one part at a time.

EXAMPLE 1

$$\begin{array}{r} 468 \\ - 323 \\ \hline \end{array}$$

$$400 - 300 = 100$$

$$60 - 20 = 40$$

$$8 - 3 = 5$$

$$100 + 40 + 5 = 145$$

EXAMPLE 2

$$\begin{array}{r} 9514 \\ - 6203 \\ \hline \end{array}$$

$$9000 - 6000 = 3000$$

$$500 - 200 = 300$$

$$14 - 3 = 11$$

$$3000 + 300 + 11 = 3311$$

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S-6

Sample Strategies

Subtract one part at a time



When you do a subtraction question that requires a grouping, subtract one part at a time.

EXAMPLE
1

$$\begin{array}{r} 132 \\ - 59 \\ \hline \end{array}$$

$$132 - 50 = 82$$

$$82 - 9 = 73$$

Check your answer by adding the following in your head:

$$73 + 59 = 120 + 12 = 132$$

EXAMPLE
2

$$\begin{array}{r} 6.25 \\ - 3.15 \\ \hline \end{array}$$

$$6.25 - 3 = 3.25$$

$$3.25 - 0.15 = 3.10$$



Don't forget to check your answer doing a mental addition.

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S-7

Sample Strategies

Balance subtraction with whole numbers

When you add the same number to the two elements of a subtraction question, the difference between the two does not change.



By adding to both elements, you balance the subtraction.

That makes it easier to find the answer in your head.

EXAMPLE
1

$$\begin{array}{r} 76 \\ - 28 \\ \hline \end{array}$$

$$76 + 2 = 78$$

$$28 + 2 = 30$$

$$78 - 30 = 48$$

EXAMPLE
2

$$\begin{array}{r} 660 \\ - 185 \\ \hline \end{array}$$

$$660 + 15 = 675$$

$$185 + 15 = 200$$

$$675 - 200 = 475$$



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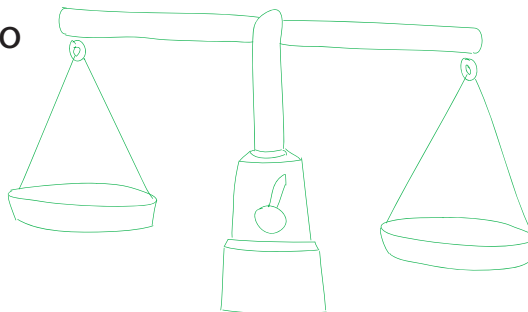
Grade 9 Mathematics (10F)

S-8

Sample Strategies

Balance subtraction with decimal numbers

When you add the same number to the two elements of a subtraction question, the difference between the two does not change.



Adding to both elements balances the subtraction.

That makes it easier to find the answer in your head.

EXAMPLE 1

$$\begin{array}{r} 4.32 \\ - 1.95 \\ \hline \end{array}$$

$$4.32 + 0.05 = 4.37$$

$$1.95 + 0.05 = 2$$

$$4.37 - 2 = 2.37$$

EXAMPLE 2

$$\begin{array}{r} 23.62 \\ - 15.89 \\ \hline \end{array}$$

$$23.62 + 0.11 = 23.73$$

$$15.89 + 0.11 = 16$$

$$23.73 - 16 = 7.73$$



Remember that you have to make sure the second element (not the first) becomes a number that is easy to subtract.

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S-9

Sample Strategies

Multiply starting from the left



It is easier to multiply in your head when you break down a number and multiply starting from the left.

Add in your head as you multiply each part.

EXAMPLE
1

$$\begin{array}{r} 635 \\ \times 4 \\ \hline \end{array}$$

$$600 \times 4 = 2400$$

$$30 \times 4 = 120$$

$$5 \times 4 = 20$$

$$2400 + 120 + 20 =$$

$$2540$$

EXAMPLE
2

$$\begin{array}{r} 528 \\ \times 3 \\ \hline \end{array}$$

$$500 \times 3 = 1500$$

$$20 \times 3 = 60$$

$$8 \times 3 = 24$$

$$1500 + 60 + 24 = 1584$$

Mental Math

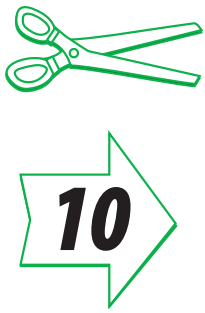
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S-10

Sample Strategies

Cut and paste the zeros

In multiplication, when one factor is multiplied by 10, the result is also multiplied by 10.


$$\begin{array}{r} 6 \\ \times 4 \\ \hline 24 \end{array} \quad \begin{array}{r} 60 \\ \times 4 \\ \hline 240 \end{array}$$

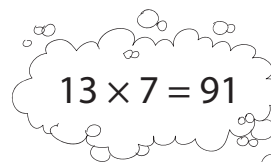

Knowing this concept, you can easily multiply by 10 in your head by following these steps:



1. Cut all the zeros at the end.
2. Multiply the remaining numbers.
3. Paste all the zeros back.

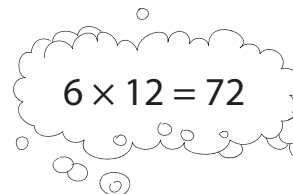

EXAMPLE
1

$$\begin{array}{r} 13 \\ \times 70 \\ \hline \end{array}$$


$$13 \times 7 = 91$$

$$910$$

EXAMPLE
2

$$\begin{array}{r} 6000 \\ \times 1200 \\ \hline \end{array}$$


$$6 \times 12 = 72$$

$$7,200,000$$

Mental Math

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S-11

Sample Strategies

Cut and paste the zeros

To mentally divide numbers that end in zero, follow these steps:



1. Cut all the zeros at the end.
2. Do the division.
3. Paste the zeros back.



EXAMPLE
1

$$\begin{array}{r} 2400 \\ \div 6 \\ \hline \end{array}$$

$24 \div 6 = 4$

400

Check the answer by multiplying: $6 \times 400 = 2400$

EXAMPLE
2

$$\begin{array}{r} 45,000 \\ \div 15 \\ \hline \end{array}$$

$45 \div 15 = 3$

3000

Check: $15 \times 3000 = 45,000$

Mental Math

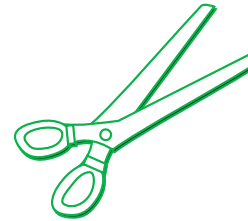
Grade 9 Mathematics (10F)

S-12

Sample Strategies

Cut the zeros in dividend and divisor

When dividing the dividend and divisor by the same amount, the quotient does not change.



$$\begin{array}{r} 800 \\ \div 20 \\ \hline \end{array} \quad \rightarrow \quad \begin{array}{r} 80 \\ \div 2 \\ \hline \end{array} \quad \rightarrow \quad 40$$

Knowing this concept will help you do division in your head more easily when the dividend and the divisor both end in zero.



All you have to do is divide both the dividend and divisor by the same value, 10.

EXAMPLE
1

$$\begin{array}{r} 6300 \\ \div 90 \\ \hline \end{array}$$

630 ÷ 9

70

EXAMPLE
2

$$\begin{array}{r} 4,500,000 \\ \div 500 \\ \hline \end{array}$$

45,000 ÷ 5

9000

Mental Math

Grade 9 Mathematics (10F)

S-13

Sample Strategies

Work with prices

The sale price of items is often a little less than an even number of dollars.



To work with prices in your head, round off to the nearest dollar. Then, do the calculation required by the problem and adjust your answer.

EXAMPLE
1

$$\begin{array}{r} \$16.65 \\ + \$2.99 \\ \hline \end{array}$$

$$\begin{array}{l} \$16.65 + \$3 \\ = \$19.65 \end{array}$$

$$\$19.65 - 1\text{¢} =$$

$$\$19.64$$

EXAMPLE
2

$$\begin{array}{r} \$19.98 \\ \times \quad 6 \\ \hline \end{array}$$

$$6 \times \$20 = \$120$$

$$6 \times 2\text{¢} = 12\text{¢}$$

$$\$120 - 12\text{¢} =$$

$$\$119.88$$

Mental Math

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S-14

Sample Strategies

Check your change

When you buy something, it is important to check that the amount of change returned to you is correct.

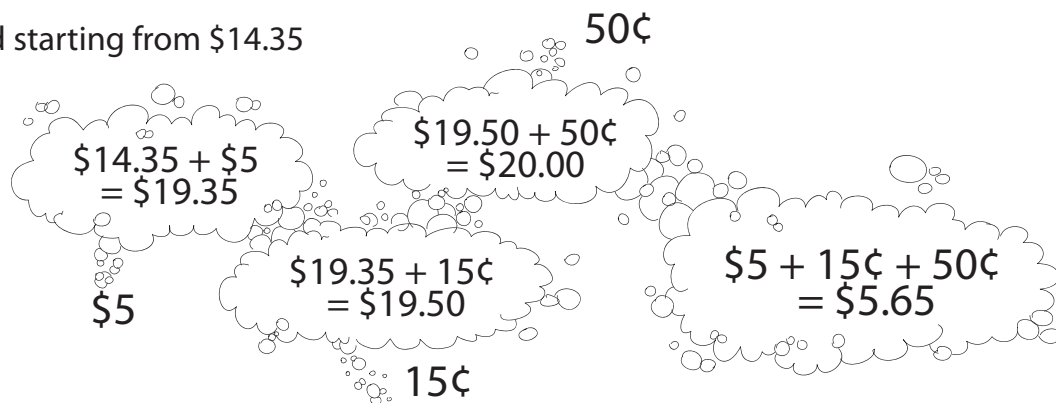


There is an easier way than subtracting in your head: **add to the purchase price.**

EXAMPLE 1

You buy a CD for \$14.35 with a \$20 bill. How much change should you get back?

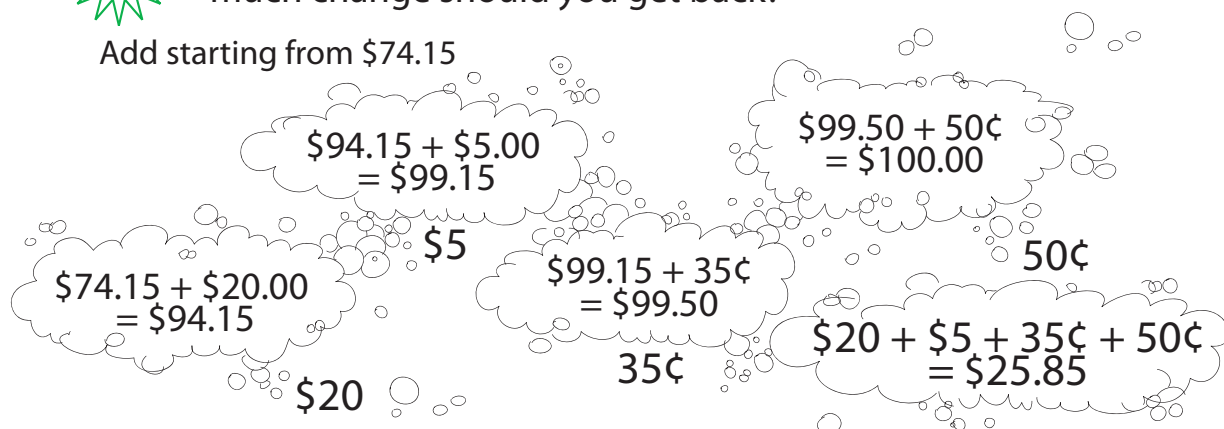
Add starting from \$14.35



EXAMPLE 2

You buy a watch for \$74.15 with a \$100 bill. How much change should you get back?

Add starting from \$74.15



Mental Math

Grade 9 Mathematics (10F)

S-15

Sample Strategies

Find the time difference

Mental math calculation is useful to find how much time is left before an event.



To find the difference between two given times, add by steps.

EXAMPLE 1

If it is 8:27 a.m., how long do you have to wait before lunch at noon?

8:27 a.m. to 8:30 a.m.
3 MINUTES

TO 9:00 a.m.
30 MINUTES

TO 12:00 noon
3 HOURS

3 HOURS
33 MINUTES

EXAMPLE 2


If it is 9:50 a.m., how much time is there before 8:15 p.m.?

9:50 a.m. to 10:00 a.m.
10 MINUTES

TO 8:00 p.m.
10 HOURS

TO 8:15 p.m.
15 MINUTES

10 HOURS
25 MINUTES



Mental Math Questions by Unit

Grade 9 Mathematics

Mental Math

Grade 9 Mathematics (10F)

A-1

Strand: Number

Specific Learning Outcome: 9.N.1

General Questions	Answers
1. How many half-dozen packages of eggs does it take to get 420 eggs?	70 packages
2. Evaluate: $32 \div 0.5$	64
3. How many centimetres are equivalent to 67 mm?	6.7 cm
4. At the hardware store, the price of a tool box is \$300. It is on sale for 40% off. What is the sale price of the tool box?	\$180
5. If Andre completed $\frac{3}{8}$ of his homework and Patricia completed $\frac{2}{3}$ of hers, who is closer to completing their homework?	Patricia
6. If one notebook costs \$0.27, how much do 100 notebooks cost?	\$27
Unit Questions	
7. Write the following in repeated multiplication form: 2^5	$2 \times 2 \times 2 \times 2 \times 2$
8. Evaluate: 3^3	27
9. Evaluate: 1^8	1
10. Evaluate: $(-3)^0$	1
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

A-2

Strand: Number

Specific Learning Outcome: 9.N.1

General Questions

1. Add: $79 + 88 + 12$
2. Estimate the value of a 9% tip on a bill of \$51.30.
3. Gilles is paid commission at a rate of 5% of his sales. How much commission does Gilles earn if he sells a shirt for \$40?
4. If 15 out of the 30 kids in French class read at least one book a month, what fraction of the kids are monthly readers?
5. How many days are there in 18 weeks?
6. Subtract: $\frac{4}{5} - \frac{9}{25}$

Answers

179

$\approx \$5$

\$2

$\frac{1}{2}$

126 days

$\frac{11}{25}$

Unit Questions

7. Write the following multiplication in exponent form:
 $5 \times 5 \times 5 \times 5 \times 5 \times 5$
8. Which is larger: 3^4 or 4^3 ?
9. Find the difference: $2^6 - 2^3$
10. Evaluate: $5^2 + 4^0$

5^6

3^4

56

26

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

A-3

Strand: Number

Specific Learning Outcome: 9.N.2

General Questions	Answers
1. If, on average, a cafeteria sells 42 tuna sandwiches each day, how many would be sold in 5 days?	210 sandwiches
2. Write $\frac{2}{5}$ as a number in decimal form.	0.4
3. How much change will you get back if you make a purchase of \$38.17 using a \$50 bill?	\$11.83
4. Add: $\frac{3}{5} + \frac{54}{10}$	$\frac{60}{10}$ or 6
5. To receive 80% on a test worth 40 marks, how many marks do you need?	32 marks
6. If you run at a speed of 3 m/s for 300 s, how many metres will you run?	900 m
Unit Questions	
Simplify the expressions by writing the results in exponent form.	
7. $(6^3)(6^2)$	6 ⁵
8. $\frac{7^{12}}{7^4}$	7 ⁸
9. $(9^2)^3$	9 ⁶
10. $(12^4)^0$	12 ⁰ or 1
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

A-4

Strand: Number

Specific Learning Outcome: 9.N.2

General Questions

1. One-quarter of 88 houses on the same street have two-door garages. How many houses does that represent?
2. If Sonia earns \$28 per shift, how much money will she earn after 4 shifts?
3. Add: $31 + (-19)$
4. Eight out of 25 students in your swimming class swim 3 mornings per week. What percentage of students does that represent?
5. How many 25¢ coins are equivalent to \$7.50?
6. Simplify the fraction $\frac{-25}{75}$.

Answers

22 houses

\$112

12

32%

30 quarters

$-\frac{1}{3}$

Unit Questions

7. Simplify the expression and write it in exponent form: $(13^2 \times 13^7)^4$
8. Simplify: $\left(\frac{2}{3}\right)^3$
9. Simplify: $4^2 \times 5^2$
10. Simplify: $\frac{3^2 + 8^0}{5^2}$

13^{36}

$\frac{8}{27}$

400

$\frac{2}{5}$

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

A-5

Strand: Number

Specific Learning Outcome: 9.N.3

General Questions	Answers
1. Simplify the fraction $\frac{-8}{-36}$.	$\frac{2}{9}$
2. Subtract: $\frac{9}{2} - \frac{5}{2}$	2
3. What is the cost of 4 pens if each pen costs \$1.97?	\$7.88
4. What is the probability of flipping a 25¢ coin and receiving heads?	$\frac{1}{2}$
5. The square root of 71 is found between which two consecutive whole numbers?	8 and 9
6. The monthly rent on an apartment is \$600. If the rent is raised by 1%, what is the new cost to rent the apartment each month?	\$606
Unit Questions	
7. Find the value of the decimal that corresponds to $0.7 + \frac{3}{5}$.	1.3
8. Put the following in ascending order: $\frac{3}{4}, \frac{2}{5}, \frac{4}{6}$	$\frac{2}{5}, \frac{4}{6}, \frac{3}{4}$
9. The fraction $\frac{37}{8}$ is found between which two consecutive whole numbers?	4 and 5
10. Find the fraction that corresponds to $0.8 + \frac{2}{5}$.	$\frac{6}{5}$
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

A-6

Strand: Number

Specific Learning Outcome: 9.N.3

General Questions

1. Joel mixes one box of orange juice with four boxes of water. Express the mix in ratio form.
2. If 1 kilogram is equivalent to 2.2 pounds, how many pounds are in 100 kg?
3. How much money would you earn if you worked 40 hours at \$7.50 per hour?
4. What is the next number in the following sequence: 2, 4, 8, 16, _____?
5. Evaluate the circumference of a circle with a radius of 5 cm if $\pi \approx 3$.
6. Place the following in ascending order: $0.7, \frac{8}{9}, \frac{1}{3}, 0.09$

Answers

1:4

220 pounds

\$300

32

30 cm

$0.09, \frac{1}{3}, 0.7, \frac{8}{9}$

Unit Questions

7. Place the following in ascending order: $-0.2, -\frac{4}{7}, -0.8, -\frac{1}{6}$
8. Multiply: $7^0 \times 5^2$
9. Write $\frac{7}{20}$ in decimal form.
10. Write 0.56 as a reduced fraction.

$-0.8, -\frac{4}{7}, -0.2, -\frac{1}{6}$

25

0.35

$\frac{14}{25}$

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

A-7

Strand: Number

Specific Learning Outcome: 9.N.4

General Questions

1. Multiply: $9 \times \frac{2}{3}$
2. If you leave a tip of 10% on a bill of \$34, what is your total cost?
3. Reduce the fraction $\frac{15}{45}$.
4. What two numbers have a sum of 9 and a product of 20?
5. Calculate the perimeter of a garage with a width of 8 m and a length of 16 m.
6. What is the total cost of 5 flower pots if each pot costs \$3.50?

Answers

6

\$37.40

$\frac{1}{3}$

4 and 5

48 m

\$17.50

Unit Questions

7. Evaluate: $2(3)^2$
8. Evaluate: $50 - 2^5$
9. Evaluate: -4^2
10. Evaluate: $1 + 2 \times 3 + 4$

18

18

-16

11

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

A-8

Strand: Number

Specific Learning Outcome: 9.N.4

General Questions

1. David spends at least 65 minutes a day at the Fitness Centre. How many minutes does he spend in 5 days?
2. Evaluate: $5^2 + 10^2$
3. The square root of 111 is found between which two consecutive whole numbers?
4. The price of a \$320 camera is reduced by 40%. What is the amount of the reduction?
5. Write the expression that represents twice the sum of x and 5.
6. Express $\frac{1}{4}$ as a number in decimal form.

Answers

325 minutes

125

10 and 11

\$128

$2(x + 5)$

0.25

Unit Questions

7. Evaluate: $(5^2 - 2^4) \times 3$
8. Evaluate: $(12 - 3 \times 3) \times 5$
9. Evaluate: $10 + (2 \times 3 - 15)^0$
10. In an enclosure, there are 11 rabbits and 3 ducks. Calculate the number of legs.

27

15

11

50 legs

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

A-9

Strand: Number

Specific Learning Outcome: 9.N.5

General Questions	Answers
1. What is the price of 3 barbecues at \$199 each?	\$597
2. In a volleyball team with 12 players, 8 of them measure more than 2.0 m. What fraction of the players does this represent?	$\frac{2}{3}$
3. Estimate: $\sqrt{1620}$	≈ 40
4. If the price of a \$40 blouse is raised by 10%, what is the new price of the blouse?	\$44
5. Divide a bill for \$36.03 equally among 3 people.	\$12.01/person
6. Is the quotient, $\frac{-0.22}{-0.12}$, positive or negative?	positive
Unit Questions	
7. Evaluate: $\sqrt{\frac{16}{25}}$	$\frac{4}{5}$
8. Find the negative square root of $\frac{81}{49}$.	$-\frac{9}{7}$
9. Evaluate: $\sqrt{25} + \sqrt{36}$	11
10. Determine the value of $\sqrt{(9 + 4 \times 5 \times 2)}$.	7
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

A-10

Strand: Number

Specific Learning Outcome: 9.N.5

General Questions

Answers

1. If you read 132 pages of a 400-page book, how many pages do you have left to read?
2. Add: $-33 + 18$
3. If you buy an item that costs \$13.65 with a \$20 bill, how much money will you get back?
4. How many months with 31 days are there in a year?
5. Is the value of the expression $3^2 + 5^2 - 6^2$ negative or positive?
6. Rene is 37 years old. Her son, Joel, is 13 years old. How old was Rene when her son was born?

268 pages

-15

\$6.35

7

negative

24 years old

Unit Questions

7. Evaluate: $-\sqrt{625}$
8. Evaluate: $\sqrt{3^4}$
9. Evaluate: $\sqrt{152^2}$
10. Which of the following numbers are perfect squares?
2 144 120 92 4900

-25

9

152

144 and 4900

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

A-11

Strand: Number

Specific Learning Outcome: 9.N.5

General Questions	Answers
1. Add: $\frac{1}{6} + \frac{1}{7}$	$\frac{13}{42}$
2. If a total of 408 spectators came to your school's tennis tournament last Friday and Saturday, how many spectators came on average each day?	204 spectators
3. Write $\frac{1}{5}$ in decimal form.	0.2
4. Colin has \$29 more in his pocket than Sylvie. If Sylvie has \$45, how much money does Colin have?	\$74
5. Reduce the ratio 35:15 to its simplest form.	7:3
6. If you work 40 hours at \$7 per hour, how much money will you earn?	\$280
Unit Questions	
7. Evaluate: $\sqrt{\frac{9}{16}}$	$\frac{3}{4}$
8. What is the negative square root of the expression $99 - 5 + 3 \times 2$?	-10
9. Evaluate: $13 - \sqrt{144} \times 5$	-47
10. The square root of a number is 14. What is that number?	196
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

A-12

Strand: Number

Specific Learning Outcome: 9.N.6

General Questions

1. Evaluate: $18 + 6 \div 2 \times 3$
2. What is the perimeter of an equilateral triangle if each side measures 15 m?
3. Determine the total cost of your lunch at the school cafeteria from Monday to Friday, if you spend at least \$7.50 per lunch.
4. What is the lowest common denominator of $\frac{5}{6}$ and $\frac{9}{10}$?
5. If 22% of 50 students are part of the school orchestra, how many students does that represent?
6. If a turkey takes 4.5 hours to cook, how many minutes does it take?

Answers

27

45 m

\$37.50

30

11 students

270 minutes

Unit Questions

7. The value of $\sqrt{21}$ is found between which two consecutive numbers?
8. Estimate the value of $\sqrt{30}$.
9. Find the value of $\sqrt{0.16}$.
10. The value of $\sqrt{87}$ is found between which two consecutive numbers?

4 and 5

≈ 5.2 to 5.5

0.4

9 and 10

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

A-13

Strand: Number

Specific Learning Outcome: 9.N.6

General Questions	Answers
1. Find the equivalent fraction of $\frac{31}{100}$ if its denominator is 1000.	$\frac{310}{1000}$
2. Determine the total cost if you buy a pair of runners that costs \$74, a ball that costs \$89, and a water bottle that costs \$11.	\$174
3. What two numbers have a sum of 5 and a product of 4?	1 and 4
4. If you make a purchase of \$8.41 with a \$20 bill, how much money will you get back?	\$11.59
5. What is the next number in the sequence: 15, 21, 27, 33, ____?	39
6. On a test with 199 multiple choice questions, you received 149 correct answers. Estimate your results as a percentage.	$\approx 75\%$
Unit Questions	
7. Estimate the value of $\sqrt{9.2 \times 4.3}$ as a whole number.	≈ 6
8. Determine the approximate value of $\sqrt{\frac{17}{50}}$ (as a fraction).	$\approx \frac{4}{7}$
9. The value of the negative square root of 88 is found between what two integers?	-9 and -10
10. Find the value of $\sqrt{0.0025}$.	0.05
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

B-1

Substrand: Patterns

Specific Learning Outcome: 9.PR.1

General Questions	Answers
1. To make punch, Jean mixed 4 parts water to 1 part frozen juice. What is the ratio of water to the amount of punch?	4:5
2. If the price of a ticket to a baseball game is \$15, how many tickets can you buy with \$225?	15 tickets
3. How long will it take to drive 480 km at a speed of 40 km/hour?	12 hours
4. If Andrew can plant 3 flowers in 1 minute, how many flowers can he plant in 2 hours?	360 flowers
5. What is the total cost of 4 video games at \$45 each?	\$180
6. Multiply: $\frac{28}{7} \times \frac{1}{2}$	2
Unit Questions	
7. Find the next number in the sequence: 1, 1, 2, 3, 5, 8, 13, ____?	21
8. Find the next number in the following sequence: 100, 400, 900, 1600, 2500, 3600, ____	4900
9. A rectangle has a length of $2x + 1$ units. If you triple the length of the rectangle, write an expression representing the new length.	$3(2x + 1)$ or $6x + 3$
10. Paul is now 7 years old. Write an equation that represents his age x years from now.	$x + 7$
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

B-2

Substrand: Patterns

Specific Learning Outcome: 9.PR.1

General Questions

1. What is the value of the hypotenuse of a right triangle if the other two sides measure 5 and 12.
2. Lucille takes 11 hours to crochet a doily. How many hours will it take to crochet one for each of her 15 friends?
3. The square root of 28 lies between what 2 positive, consecutive integers?
4. You deposit two cheques with values of \$143 and \$228 into your account. What is the total amount of your deposit?
5. What value of x satisfies the equation $4 + x = 0$?
6. If you get a mark on your math test of $\frac{21}{25}$, what is your mark as a percentage?

Answers

13

165 hours

5 and 6

\$371

$x = -4$

84%

Unit Questions

7. Find the missing number in the following sequence:
1, 2, 4, 8, ____, 32
8. Write the mathematical statement corresponding to:
"Eight less than two times a number is equal to four."
9. Complete this pattern: $1 \rightarrow 2, 2 \rightarrow 4, 3 \rightarrow 9, 4 \rightarrow 16, a \rightarrow$ ____
10. Find the missing number in the following sequence:
0, 3, 8, 15, 24, 35, 48, ____

16

$2x - 8 = 4$

a^2

63

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

B-3

Strand: Patterns

Specific Learning Outcome: 9.PR.1

General Questions	Answers
1. A dictionary costs \$64 and a novel costs \$52. What is the total price of the two books?	\$116
2. Multiply and simplify: $\frac{2}{5} \times \frac{15}{8}$	$\frac{3}{4}$
3. You are offered 30% off of a \$50 kite. What is the new price?	\$35
4. What is the cost of 1 kg of whole wheat flour if 6 kg cost \$9?	\$1.50
5. What two numbers have a sum of 18 and a product of 81?	9 and 9
6. Estimate the number of water bottles you would need each day for 111 athletes who each require an average of 2.7 water bottles a day?	≈ 300
Unit Questions	
7. Write the mathematical statement corresponding to the following written statement: "The sum of two consecutive integers is equal to negative eleven."	$x + (x + 1) = -11$ or $2x + 1 = -11$
8. Complete this pattern: $-1 \rightarrow 1, 2 \rightarrow 4, 3 \rightarrow 5, 4 \rightarrow 6, x \rightarrow \underline{\hspace{1cm}}$	$x + 2$
9. Your current age is x years. Write an expression to represent your age 12 years ago.	$x - 12$
10. Find the next number in the sequence: 2, -10, 50, -250, $\underline{\hspace{1cm}}$	1250
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

B-4

Substrand: Patterns

Specific Learning Outcome: 9.PR.2

General Questions

1. What is the value of $\sqrt{164}$ to the nearest integer.
2. In a class of 40 students, 40% have never travelled to Nopiming Provincial Park. How many students is that?
3. Find the perimeter of a regular hexagon if one side measures 8 cm.
4. Add: $\frac{4}{9} + \frac{1}{3}$
5. If you work 8 hours a day for 2 days at \$11 per hour, what is your gross income?
6. It was 7°C Monday, 10°C Tuesday, and 7°C Wednesday. What is the average temperature over these 3 days?

Answers

13

16 students

48 cm

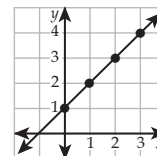
$\frac{7}{9}$

\$176

8°C

Unit Questions

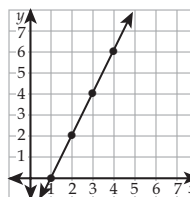
7. Sketch the graph of $y = x + 1$.
8. Given, $y = 3x - 1$, find the value of y when $x = 10$.
9. In the graph shown, what is the value of x when $y = 4$?
10. In the graph shown, what is the value of y when $x = 3.5$?



29

$x = 3$

$y = 5$



Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

B-5

Substrand: Patterns

Specific Learning Outcome: 9.PR.2

General Questions

1. If 6 friends go to the lake and catch 21 fish each, how many fish were caught in total?
2. A raincoat that costs \$155 is reduced by 10%. How much is the cost of the coat reduced by?
3. Calculate the area of a triangle with a base of 6 cm and a height of 10 cm.
4. Subtract: $\frac{3}{2} - \frac{1}{2}$
5. Evaluate: $0 \div \frac{7}{8}$
6. Jacob can swim 10 lengths of the pool in 5 minutes. At this pace, how many lengths can he swim in an hour?

Answers

126 fish

\$15.50

30 cm²

1

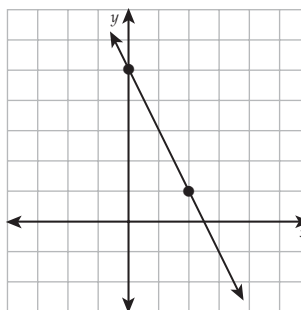
0

120 lengths

Unit Questions

The graph below shows a line that passes through the points (0, 5) and (2, 1).

7. What is the value of x when $y = 0$?
8. What is the value of y when $x = 1$?
9. Determine the value of x when $y = 7$.
10. Determine the value of y when $x = 4$.



$$x = 2\frac{1}{2}$$

$$y = 3$$

$$x = -1$$

$$y = -3$$

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

B-6

Substrand: Patterns

Specific Learning Outcome: 9.PR.2

General Questions

1. How many thirds are equivalent to 8?
2. Calculate 5% of a \$5 hamburger.
3. If you ate 6 of 8 pieces in an apple pie, what percentage would you have left?
4. What value is the smallest, $\frac{2}{3}$ or $\frac{4}{7}$?
5. What is the lowest common denominator for $\frac{2}{7}$ and $\frac{2}{3}$?
6. In a school survey, 50% of 122 students said they compost at home. How many students does that represent?

Answers

24 thirds or $\frac{24}{3}$

\$0.25 or
25 cents

25%

$\frac{4}{7}$

21

61 students

Unit Questions

Given the following table:

hours (h)	0	1	4	6
pay (\$)	0	11	44	66

7. What is the independent variable?
8. Pay of \$110 corresponds to how many hours worked?
9. Does question 8 represent an interpolation or an extrapolation of the data?
10. What is the hourly rate of pay?

hours

10 hours

extrapolation

\$11/hour

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

C-1

Substrand: Variables and Equations

Specific Learning Outcome: 9.PR.3

General Questions	Answers
1. What number satisfies the equation $\frac{4}{9} = \frac{x}{27}$?	$x = 12$
2. If 35 out of 54 students in Grade 9 participate in after-school sports, how many students do not participate in after-school sports?	19 students
3. If you buy French fries that cost \$2.63 with a \$5 bill, how much money will you get back?	\$2.37
4. Divide a bill of \$93 equally among 3 people. How much does each person pay?	\$31
5. Simplify: $\frac{1}{2} \div \frac{2}{5}$	$\frac{5}{4}$ or $1\frac{1}{4}$
6. How many centimetres are equivalent to 8 km?	800 000 cm
Unit Questions	
7. Solve: $3x = 12$	$x = 4$
8. Solve: $4x - 2 = 18$	$x = 5$
9. Solve: $5x - 6 = 4$	$x = 2$
10. Solve: $2(x - 3) = 8$	$x = 7$
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

C-2

Substrand: Variables and Equations

Specific Learning Outcome: 9.PR.3

General Questions

1. Evaluate: $2 + 6 \times 5$
2. Paul says his annual salary is equal to three-fourths of \$60,000. What is his annual salary?
3. What is the area of a gymnasium that measures 30 m by 50 m?
4. Damien is 12 years old. His cousin Roland is 18 years old and his uncle Patrick is 30 years old. What is the average age of Damien, Roland, and Patrick?
5. Francisco got a mark of $\frac{46}{50}$ on his social studies exam. Express his results as a percentage.
6. Express $\frac{3}{5}$ as a number in decimal form.

Answers

32

\$45,000

1500 m²

20 years

92%

0.6

Unit Questions

7. Is $x = -3$ the solution to the equation $2x + 6 = 12$? Justify your answer.
8. Solve: $\frac{x}{8} = 12$
9. Solve: $\frac{24}{x} = 6$
10. Solve: $\frac{3}{x} = 6$

No, since $2(-3) + 6 \neq 12$.

$x = 96$

$x = 4$

$x = \frac{1}{2}$

Other Questions

11.

12.

Mental Math

C-3

Grade 9 Mathematics (10F)

Strand: Variables and Equations

Specific Learning Outcome: 9.PR.3

General Questions

1. There are 9 boys and 13 girls in the classroom. What is the probability of randomly choosing a girl?
2. If the balance of your savings account is \$80 and you withdraw \$43 with your debit card, how much money is left in your savings account?
3. Jonathan can type 40 words per minute on the computer. After one hour, how many words will he type?
4. Tristan has 256 hockey cards. Eric has two times that number of hockey cards. How many hockey cards does Eric have?
5. What is the next number in the following pattern: 56, 50, 44, 38, ___?
6. Express $\frac{3}{20}$ as a number in decimal form.

Answers

$$\frac{13}{22}$$

\$37

2400 words

512 cards

32

0.15

Unit Questions

7. Solve: $3x = 10 + x$
8. Solve: $-2x = -8 - 3 + 5$
9. What is the opposite of adding $\frac{1}{4}$?
10. Solve: $2(x + 2) = 18$

$$x = 5$$

$$x = 3$$

subtracting $\frac{1}{4}$

$$x = 7$$

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

C-4

Substrand: Variables and Equations

Specific Learning Outcome: 9.PR.3

General Questions

1. Reduce the fraction $\frac{50}{450}$.
2. If the price of an \$800 canoe is reduced by 25%, what is the final price of the canoe?
3. How many minutes elapse between 12:15 p.m. and 4:00 p.m.?
4. What is the median of the following set of numbers: 1, 6, 8, and 10?
5. How much will each person receive if \$640 is divided equally among eight people?
6. How many weeks will it take to repay a debt of \$500 if you make payments of \$25/week?

Answers

$$\frac{1}{9}$$

\$600

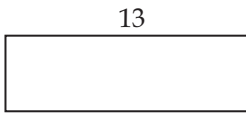
225 minutes

7

\$80

20 weeks

Unit Questions

7. Solve: $0.7x + 1.8x = 10$
8. Solve: $\frac{x}{3} + 5 = 20$
9. Find the value of x if the perimeter of the rectangle shown measures 46 units.

10. Is $x = 2$ the solution for the equation $2(x + 3) + 5x = 3x + 14$? Justify your answer.

$$x = 4$$

$$x = 45$$

$$x = 5$$

Yes, both sides equal 20.

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

C-5

Substrand: Variables and Equations

Specific Learning Outcome: 9.PR.4

General Questions

1. Add: $\$4.99 + \$0.99 + \$5.99$
2. How much money will you earn per month if you earn \$24,000 per year?
3. Express $\frac{9}{20}$ in decimal form.
4. Which of the following fractions is smaller: $\frac{4}{9}$ or $\frac{1}{5}$?
5. If your savings account balance is \$430 and you deposit a cheque for \$210, what is your new account balance?
6. If you are charged a 2% delivery charge on a new \$250 bike, what is the cost of the delivery charge?

Answers

\$11.97

\$2000

0.45

$\frac{1}{5}$

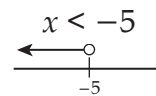
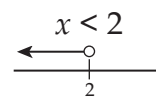
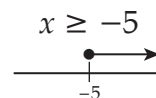
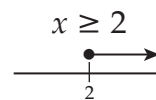
\$640

\$5.00

Unit Questions

Solve and show your answer on a number line.

7. $2x \geq 4$
8. $-3x \leq 15$
9. $3 + 2x < x + 5$
10. $5 - 5x > 10 - 4x$



Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

C-6

Substrand: Variables and Equations

Specific Learning Outcome: 9.PR.4

General Questions

1. Water bottles cost \$1.30 each. How many water bottles could you buy with \$5.20?
2. Evaluate: 1^{49}
3. Write $\frac{2}{8}$ in decimal form.
4. Estimate a tip of 10% on a bill of \$48.75.
5. Reduce the ratio 24:18 to its simplest form.
6. What number is found halfway between 8 and 20?

Answers

4 bottles

1

0.25

\approx \$5

4:3

14

Unit Questions

7. When dividing by a negative number on both sides of a linear inequality, what happens to the inequality symbol?
8. You have \$5 and want to spend some of it to buy x bars of chocolate, which cost 0.67¢ each. Write an inequality that represents this.
9. If $x = 2$, then $3x > 2x + 3$. True or false?
10. If $x = -2$, then $-2x + 5 > 5$. True or false?

It changes direction.

$67x \leq 500$ or
 $0.67x \leq 5$

False

True

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

C-7

Substrand: Variables and Equations

Specific Learning Outcome: 9.PR.4

General Questions	Answers
1. You are charged a delivery fee of 6% on the value of a sofa costing \$500. How much are your delivery charges?	\$30
2. Solve: $18 + w = 30$	$w = 12$
3. If the balance in your chequing account is \$410 and you deposit \$34.70, what is your new account balance?	\$444.70
4. How many centimetres are equivalent to 49.4 m?	4940 cm
5. Alex spends one hour reading 22 pages of a novel. At this rate, how many pages will he read in 5 hours?	110 pages
6. Write the number equivalent to $\frac{9}{15}$ in decimal form.	0.6
Unit Questions	
7. In the solution to an inequality, explain the difference between $x > 5$ and $x \geq 5$.	$x > 5$ does not include 5. $x \geq 5$ includes 5.
8. You have at most \$110 to spend on a number of pizzas that cost \$12 each. The delivery charge is \$7. Write an inequality that models this situation.	$12x + 7 \leq 110$
9. Determine the maximum number of pizzas you could buy and have delivered as described in question 8.	8 pizzas
10. Is $x = 1$ the solution to the equation $3(x + 4) + 2x < 4x + 9$? Justify your answer.	No, $17 \not< 13$.
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

C-8

Substrand: Variables and Equations

Specific Learning Outcome: 9.PR.5

General Questions

1. At a restaurant, you want to leave a tip of 15% on a bill of \$12.05. Estimate the value of your tip.
2. Add: $\frac{2}{3} + \frac{1}{6}$
3. Multiply: $5 \times 82 \times 2$
4. What is the perimeter of a schoolyard that measures 900 m by 300 m?
5. You take 2 minutes to complete 3 math problems. At this rate, how many minutes will it take you to complete your homework if you have 18 problems?
6. In 280 days, Kamal is travelling to Asia. How many weeks until she leaves?

Answers

$\approx \$1.80$

$\frac{5}{6}$

820

2400 m

12 minutes

40 weeks

Unit Questions

What name do you give to each of the parts of the expression $4x^2 + 8$?

7. 4
8. x
9. 2
10. 8

coefficient

variable

exponent

constant
(or term)

Other Questions

- 11.
- 12.

Mental Math

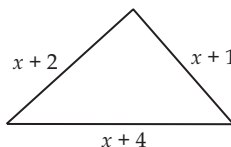
Grade 9 Mathematics (10F)

C-9

Substrand: Variables and Equations

Specific Learning Outcome: 9.PR.5

General Questions	Answers
1. If your savings account balance is \$240 and you make a withdrawal of \$42, what is your new account balance?	\$198
2. Evaluate: 31.54×10	315.4
3. Express $4\frac{5}{7}$ as an improper fraction.	$\frac{33}{7}$
4. In your French class of 20 students, 18 have already read the play <i>Les Misérables</i> . What fraction of students does that represent?	$\frac{9}{10}$ or $\frac{18}{20}$
5. Which is the better buy: 6 doughnuts for \$2.75 or 12 doughnuts for \$5?	12 doughnuts for \$5
6. Multiply: $\frac{3}{5} \times \frac{2}{3}$	$\frac{2}{5}$
Unit Questions	
7. If x is your current age, write an expression for your age in 10 years.	$x + 10$
8. One-quarter of a number equals 3. Express this in an equation.	$\frac{x}{4} = 3$
9. Write an expression to describe the perimeter of the triangle shown on the right.	$3x + 7$
10. How many terms are in the expression $4x^3 - 8x + 6y$?	3 terms
Other Questions	
11.	
12.	



Mental Math

Grade 9 Mathematics (10F)

C-10

Substrand: Variables and Equations

Specific Learning Outcome: 9.PR.5

General Questions

1. Evaluate: $6 \times 0 \times 5 \times 245$
2. Nadia is 17 years younger than Riley. If Riley is 35 years old, what age is Nadia?
3. The price of a \$420 stereo is reduced by 20%. What is the amount of the reduction?
4. If you work 12 hours at an hourly rate of \$6 per hour, what is your total pay?
5. Convert 1 cm^2 to an equivalent amount in mm^2 .
6. Which of the following fractions is smallest: $\frac{1}{3}$, $\frac{4}{5}$, $\frac{6}{13}$?

Answers

0

18 years old

\$84

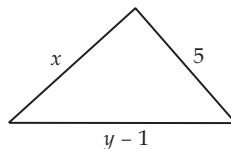
\$72

100 mm^2

$\frac{1}{3}$

Unit Questions

7. Identify the constant in the expression $8x - 16 + 3y$.
8. Write an equivalent expression to $\frac{2x + 1}{2}$.
9. Identify the like-term(s) to $3x$ amongst the following terms:
 $-2x$ $6x^2$ $3y$
10. Write an expression to describe the perimeter of the triangle shown on the right.



-16

Examples:

$$x + \frac{1}{2} \text{ or } \frac{4x + 2}{4}$$

-2x

$x + y + 4$

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

C-11

Substrand: Variables and Equations

Specific Learning Outcome: 9.PR.5

General Questions	Answers
1. Cecil swims 25 lengths of the pool 3 times a week. How many lengths of the pool will he swim in 10 weeks?	750 lengths
2. How much GST (5%) do you pay on a purchase of \$5?	\$0.25
3. What two consecutive numbers have a product of 12 and a sum of 7?	3 and 4
4. Estimate the sale price on an \$89.95 baseball glove if it is on sale for 10% off.	\approx \$81.00
5. Estimate the value of the product of 42 and 38.	\approx 1600
6. Estimate the square root of 80.	\approx 9
Unit Questions	
7. Simplify: $3x - 7x$	$-4x$
8. Simplify: $x + 3x + 6x$	$10x$
9. Simplify: $4x + 5x - 2x - x$	$6x$
10. Which term in the polynomial, $3x - 5x^2 + 6$, has the exponent with the highest degree?	$-5x^2$
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

C-12

Substrand: Variables and Equations

Specific Learning Outcome: 9.PR.6

General Questions

1. If you buy 4 boxes of cereal at \$2.99 per box, what is the total cost of your purchase?
2. Write an expression to represent the sum of x and its square.
3. What is the maximum number of people that could eat at the same time in a restaurant with 32 tables large enough to sit 4 people?
4. In a Grade 9 class with 65 students, 20% wear glasses. How many students does that represent?
5. Simplify the fraction $\frac{12}{16}$.
6. A sweater that costs \$48 is on sale for 10% off. Find the sale price.

Answers

\$11.96

$x + x^2$

128 people

13 students

$\frac{3}{4}$

\$43.20

Unit Questions

7. Simplify: $(2x + 6) - (5x - 4)$
8. Simplify: $4x + 5 + 8x^2 + 3x - 4 - 10x^2$
9. Simplify: $3x^2 + 3x + 3 - (2x^2 + 4x + 2)$
10. Find the binomial that is missing: $(3x + 1) + (\text{_____}) = 2x + 3$

$-3x + 10$

$-2x^2 + 7x + 1$

$x^2 - x + 1$

$-x + 2$

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

C-13

Substrand: Variables and Equations

Specific Learning Outcome: 9.PR.6

General Questions	Answers
1. If a herd of 32 sheep join a herd of 62 cows, how many animals are there in total?	94 animals
2. If you pay for a meal of \$11.35 with a \$20 bill, how much money will you get back?	\$8.65
3. In a lake that contains 560 fish, 290 were caught. How many fish are still in the lake?	270 fish
4. What is the amount of GST (5%) on a \$9000 boat?	\$450
5. What is the next number in the sequence: 3, 8, 13, 18, ____?	23
6. Express $\frac{2}{5}$ as a percent.	40%
Unit Questions	
7. Simplify: $(3x^2 + 2x + 6) - (5x^2 - 3x + 12)$	$-2x^2 + 5x - 6$
8. $5x^2 - 4$ is equivalent to $(3x^2 + 4x - 7) - (-2x^2 + 4x - 3)$. True or false?	True
9. Which expression is equivalent to $\frac{-6x^2 - 4x - 12}{-2}$?	b) $3x^2 + 2x + 6$
a) $3x^2 - 4x - 12$ b) $3x^2 + 2x + 6$ c) $3x^2 - 2x - 6$	
10. Simplify: $3x^2 + 3x + 3 + 2x^2 + 4x + 2$	$5x^2 + 7x + 5$
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

C-14

Substrand: Variables and Equations

Specific Learning Outcome: 9.PR.7

General Questions

1. Convert 8.5 cm into mm.
2. What percentage represents three months out of one year?
3. Evaluate: $4 + 6 \times 2$
4. What is the area of a rectangular cake that measures 20 cm by 60 cm?
5. If 30 m^3 of soil costs \$900, what is the price per m^3 ?
6. How many minutes pass between 3:55 p.m. and 6:00 p.m.?

Answers

85 mm

25%

16

1200 cm^2

$\$30/\text{m}^3$

125 minutes

Unit Questions

7. Find the product of $8x$ and $3x$.
8. Simplify: $(4ab)(3ab)$
9. Simplify: $\frac{24x^2y}{8x}$
10. Simplify: $(-5y)(-8x^2y)$

$24x^2$

$12a^2b^2$

$3xy$

$40x^2y^2$

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

C-15

Substrand: Variables and Equations

Specific Learning Outcome: 9.PR.7

General Questions	Answers
1. What number corresponds to two times the reciprocal of 4?	$\frac{1}{2}$
2. If 12 out of 30 students from your English class are going to the theatre, what fraction of students does this represent?	$\frac{2}{5}$
3. What is your total sum of money when you have 10 quarters, 12 dimes, and 6 pennies?	\$3.76 or 376¢
4. Calculate the product of 46 and 0.5.	23
5. How many grams are equal to 64 kg?	64 000 g
6. The price of an \$80 cushion was reduced by 40%. What is the sale price of the cushion?	\$48
Unit Questions	
7. Simplify: $2(x + 2y)$	$2x + 4y$
8. Simplify: $3x(2x - 4y + 1)$	$6x^2 - 12xy + 3x$
9. Simplify: $-5(8 + 2)$	-50
10. Simplify: $-5x(z^2 - 4x + 3)$	$-5xz^2 + 20x^2 - 15x$
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

C-16

Substrand: Variables and Equations

Specific Learning Outcome: 9.PR.7

General Questions

1. Add: $\frac{3}{5} + \frac{7}{10}$

2. How much PST (8%) do you have to pay on a purchase of \$30?

3. If you earn \$35 after each shift, how much money will you earn after 4 shifts?

4. There are 20 students in your mathematics class and $\frac{1}{4}$ of them are absent one day. How many students are absent?

5. An enclosure contains 23 horses. How many legs can you count?

6. Evaluate: $\frac{4}{0}$

Answers

$\frac{13}{10}$

\$2.40

\$140

5 students

92 legs

There is no such number.

Unit Questions

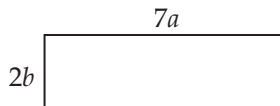
For questions 7 and 8, find the value of the polynomials knowing that $x = 3$ and $y = 2$.

7. $x^2 + y^2$

8. $-x - 3y$

9. Write an expression equivalent to $-(x - 3)$.

10. Express the area of the following rectangle in terms of a and b .



13

-9

$3 - x$ or
 $-x + 3$

$14ab$

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

D-1

Strand: Measurement

Specific Learning Outcome: 9.SS.1

General Questions

1. Add: $1050 + 40 + 12$
2. In a class of 16 students, 75% wear sandals. How many students does that represent?
3. How many metres are equivalent to 49.1 km?
4. If gasoline costs 99¢ per litre, how much would 30 litres cost (in dollars)?
5. Evaluate: $\sqrt{25}$
6. If 7 boxes of candy are \$3.50, how much are 4 boxes?

Answers

1102

12 students

49 100 m

\$29.70

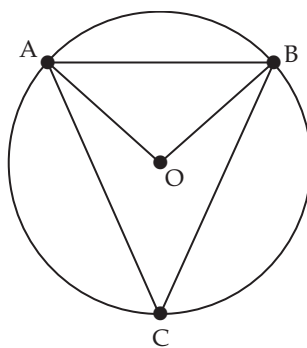
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\$2.00

Unit Questions

Use the circle below to answer questions 7 to 10.

7. Name a central angle.
8. Name an inscribed angle of arc AB.
9. Name a chord.
10. Name a minor arc.



$\angle AOB$ or $\angle BOA$

$\angle ACB$ or $\angle BCA$

\overline{AB} or \overline{AC} or \overline{BC}

\widehat{AB} or \widehat{BC} or \widehat{AC}

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

D-2

Substrand: Measurement

Specific Learning Outcome: 9.SS.1

General Questions

1. If you deposit one cheque for \$35 and a second cheque for \$49, then withdraw an amount of \$24, how much more money will you have in your account?
2. At 25¢ per minute for a long-distance telephone call, how much will you pay for a call that lasts 35 minutes?
3. Choosing a person at random, what is the probability that the person was born on a Monday?
4. Which fraction is larger: $\frac{1}{4}$ or $\frac{1}{3}$?
5. What is the total cost of 7 pencils at 13¢ each?
6. If a vintage video game originally worth \$60 increases in cost by 15%, what is the new cost of the video game?

Answers

\$60

\$8.75

$\frac{1}{7}$

$\frac{1}{3}$

91¢

\$69

Unit Questions

7. What is the measure of a right angle?
8. The measure of a central angle is _____ the measure of an inscribed angle that is subtended by the same arc.
9. All inscribed angles that are subtended by the same arc are _____.
10. What is the measure of the angle formed between a tangent line and a radius segment at the point of tangency?

90°

two times

congruent

90°

Other Questions

11.

12.

Mental Math

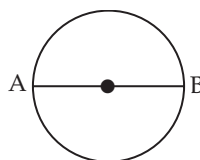
Grade 9 Mathematics (10F)

D-3

Strand: Measurement

Specific Learning Outcome: 9.SS.1

General Questions	Answers
1. If the delivery fee of a \$650 couch is 1%, what is the amount of the fee?	\$6.50
2. Estimate: 49×61	≈ 3000
3. What two numbers have a product of 24 and a sum of 11?	3 and 8
4. What is the total cost of a \$430 ticket if you also pay a \$34 tax and a \$60 delivery fee?	\$524
5. What number is 86 more than 33?	119
6. What is the area of a rectangular field that measures 50 m by 30 m?	1500 m^2
Unit Questions	
7. What is the measure of an inscribed angle subtended by a semicircle?	90°
8. Determine the radius of the following circle if $AB = 7.5 \text{ cm}$.	3.75 cm
9. The measure of an inscribed angle is _____ the measure of the central angle subtended by the same arc.	half
10. A central angle measures 64° . What is the measure of an inscribed angle subtended by the same arc?	32°
Other Questions	
11.	
12.	



Mental Math

Grade 9 Mathematics (10F)

D-4

Substrand: Measurement

Specific Learning Outcome: 9.SS.1

General Questions

- Evaluate: $\frac{1}{3} + \frac{1}{8}$
- Julia must pay \$3000 in 6 equal payments. What is the value of each payment?
- How much are 5 doughnuts if one doughnut costs 24¢?
- In a group of 120 students, 20% play squash. How many students does that represent?
- What is the median of the following set of numbers: 64, 82, 70, 73, 91?
- Keegan is 27 years old in 2014. In what year was he born?

Answers

$$\frac{11}{24}$$

\$500

\$1.20

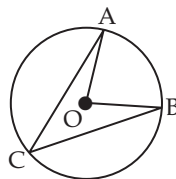
24 students

73

1987

Unit Questions

- In the circle with centre O , $\angle ACB$ measures 40° . What does $\angle AOB$ measure?

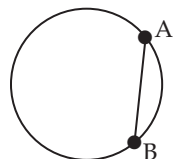


80°

- An arc that measures less than half of a circle is called a _____ arc.

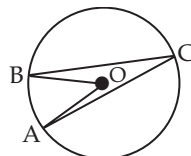
minor

- What term is used to describe line segment \overline{AB} ?



chord

- If $\angle AOB$ is 42° , what is the measure of $\angle ACB$?



21°

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

D-5

Substrand: Measurement

Specific Learning Outcome: 9.SS.1

General Questions

1. You want to make a trip from Winnipeg to Paris. If Winnipeg to Montreal is 3.5 hours and Montreal to Paris is 7.75 hours, how long is your flight?
2. Estimate the value of $\sqrt{914}$.
3. What is the price of an orange if 5 oranges cost \$3.75?
4. Add: $\frac{1}{2} + \frac{1}{8}$
5. Write the expression that represents the product of a number and 5.
6. How many 5 kg bags can be filled with one 110 kg bag of potatoes?

Answers

11.25 hours

≈ 30

75¢

$\frac{5}{8}$

$5x$

22 bags

Unit Questions

7. The arc of a circle that is exactly half of the circle is called _____.
8. The circumference of a circle is 54 cm. What is the length of the semicircle arc?
9. What is the measure of an inscribed angle subtended by a semicircle?
10. The point on the circle where a radius segment and tangent line meet is called _____.

a semicircle

27 cm

90°

the point of tangency

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

D-6

Substrand: Measurement

Specific Learning Outcome: 9.SS.1

General Questions

1. Laura said, "My mother was 31 years old when I was born." If Laura is now 24 years old, how old is her mother?
2. What is the cost of 8 water bottles at 99¢ each?
3. If 20% of the 300 students at a school have lunch at home, how many students have lunch at school?
4. Which is lower: 13% of \$300 or \$32?
5. Richard's savings account balance was \$214 and he withdrew \$60. What is the new balance?
6. What is the lowest common denominator of $\frac{1}{3} + \frac{1}{9}$.

Answers

55 years old

\$7.92

240 students

\$32

\$154

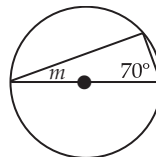
9 or ninths

Unit Questions

7. The line perpendicular to a radius segment at the point of tangency is called _____.

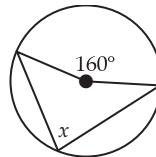
a tangent line

8. Write the measure of angle m .



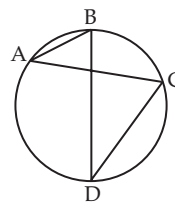
20°

9. Write the measure of angle x .



80°

10. In the circle shown, $\angle ABD$ measures 63° . Name the other angle that must also measure 63° .



$\angle ACD$ or
 $\angle DCA$

Other Questions

11.

12.

Mental Math

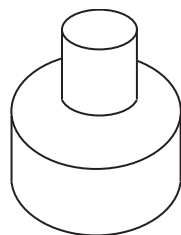
E-1

Grade 9 Mathematics (10F)

Substrand: 3-D Objects and 2-D Shapes

Specific Learning Outcome: 9.SS.2

General Questions	Answers
1. What value of m satisfies the equation $\frac{5}{4}m = 1$?	$m = \frac{4}{5}$
2. What is the volume of a pool that measures 7 m by 3 m by 2 m?	42 m ³
3. On average, if you earn \$40 each week, how much money would you earn in one year?	\$2080
4. Add: $42 + 88 + 58$	188
5. How many kilograms are equivalent to 250 g?	0.25 kg
6. A hockey player scores a goal in 25% of her games. How many goals do you expect her to make if she plays 40 games?	10 goals
Unit Questions	
For questions 7, 8, and 9, a right cylinder has a base that measures 10 cm in diameter and is sitting on top of another cylinder with a base that measures 20 cm in diameter (use $\pi \approx 3$).	
7. Estimate the area of the circular base of the little cylinder.	$\approx 75 \text{ cm}^2$
8. Estimate the surface area of the base of the big cylinder.	$\approx 300 \text{ cm}^2$
9. Estimate the area that overlaps.	$\approx 75 \text{ cm}^2$
10. How many faces are there in a right triangular prism?	5 faces
Other Questions	
11.	
12.	



Mental Math

Grade 9 Mathematics (10F)

E-2

Substrand: 3-D Objects and 2-D Shapes

Specific Learning Outcome: 9.SS.2

General Questions

1. Simplify the ratio 21 : 6.
2. Calculate the value of a 15% tip on a bill of \$20.
3. Add: $\frac{1}{2} + \frac{1}{8}$
4. Which represents the better purchase: 5 shirts for \$100 or 10 shirts for \$160?
5. Find the area of a circle with a radius of 1 cm (round to the nearest 10th).
6. There are 53 students registered for Grade 10 Essential Mathematics next year. If 38 more registrations are allowed, what total number of students will be registered?

Answers

7:2

\$3

$\frac{5}{8}$

10 for \$160

3.1 cm²

91 students

Unit Questions

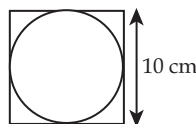
7. How many faces are there in a right rectangular prism?
8. Two cubes with 5 cm edges are glued together so that one is aligned on top of the other. What is the surface area of the glued shape?

6 faces

250 cm²

For questions 9 and 10, a right cylinder with a 10 cm diameter sits on top of a cube with 10 cm edges (as shown below in this top view). Use $\pi \approx 3$.

9. Estimate the area that overlaps.
10. Estimate the area that does not overlap.



$\approx 75 \text{ cm}^2$

$\approx 25 \text{ cm}^2$

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

E-3

Substrand: 3-D Objects and 2-D Shapes

Specific Learning Outcome: 9.SS.2

General Questions

1. Estimate a tax of 7% on a purchase of \$7.86.
2. Zahra received a mark of $\frac{14}{20}$ on her mathematics assignment. Express her results as a percentage.
3. How many hours pass between 7:00 a.m. on Monday and 7:00 p.m. on Tuesday?
4. Subtract $\frac{1}{8}$ from $\frac{1}{2}$.
5. What is the probability of rolling a 4 when you roll a standard 6-sided die?
6. You owe \$300 to a friend. How many weeks will it take you to repay your debt if you give your friend \$12 a week?

Answers

$\approx \$0.55$

70%

36 hours

$\frac{3}{8}$

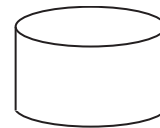
$\frac{1}{6}$

25 weeks

Unit Questions

For questions 7 and 8, refer to a right cylinder with a base having a radius measuring 3 cm and a height of 2 cm.

7. Estimate the area of the circular end (use $\pi \approx 3$).



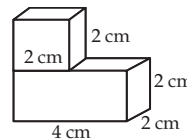
$\approx 27 \text{ cm}^2$

8. Estimate the area of the curved surface.

$\approx 36 \text{ cm}^2$

For questions 9 and 10, use the diagram below in which a cube is on top of a rectangular prism.

9. Determine the area of the overlap.
10. Determine the surface area of the front face of the shape.



4 cm^2

12 cm^2

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

E-4

Substrand: 3-D Objects and 2-D Shapes

Specific Learning Outcome: 9.SS.3

General Questions

1. You have \$216 in your wallet. How much money will you have left over if you purchase a bracelet for \$80?
2. Evaluate: $\frac{1}{2} \times \frac{3}{8}$
3. How much money will you get back if you make a purchase of \$14.76 with a \$20 bill?
4. How many \$10 bills are equivalent to \$1000?
5. Find the area of a triangle with a base of 4 m and a height of 6 m.
6. Solve the equation $4 + 2x = 10$.

Answers

\$136

$\frac{3}{16}$

\$5.24

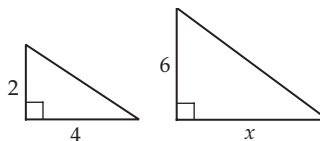
100 bills

12 m²

$x = 3$

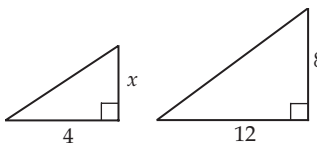
Unit Questions

7. Two similar triangles are shown. Find the value of x .



8. If two triangles are similar, the measurements of their corresponding sides are equal. True or false?
9. Complete the sentence. If two triangles are similar, the measures of their corresponding angles are _____.

10. Two similar triangles are shown. Find the value of x .



12

False

equal

$\frac{8}{3}$

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

E-5

Substrand: 3-D Objects and 2-D Shapes

Specific Learning Outcome: 9.SS.3

General Questions

1. Simplify the fraction $\frac{12}{16}$.
2. You deposit two cheques of \$438 and \$142 in your savings account. What is the total amount of your deposit?
3. What is the volume of a pool that measures 20 m by 4 m by 10 m?
4. If you raise the price of a pair of \$240 skates by 10%, what is the new price?
5. Which of the following fractions is smaller: $\frac{4}{9}$ or $\frac{2}{3}$?
6. How much will each of 7 lottery prize winners get if they divide \$3500 equally?

Answers

$$\frac{3}{4}$$

\$580

800 m³

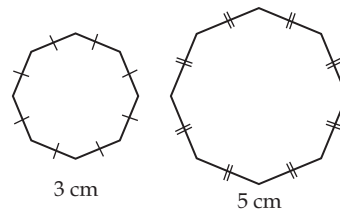
\$264

$$\frac{4}{9}$$

\$500

Unit Questions

7. A regular octagon with 5 cm sides is similar to a regular octagon with 10 cm sides. True or false?
8. A regular pentagon with 2 cm sides is similar to a regular hexagon with 2 cm sides. True or false?
9. Are these two polygons similar? Explain.



True

False

Yes, same shape and same angles

10. Solve for x in the proportion: $\frac{x}{8 \text{ cm}} = \frac{3 \text{ cm}}{2 \text{ cm}}$

$$x = 12 \text{ cm}$$

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

E-6

Substrand: 3-D Objects and 2-D Shapes

Specific Learning Outcome: 9.SS.3

General Questions

1. If 89% of 200 students from a school live at least 10 km from school, how many students live at least 10 km from school?
2. Evaluate: $-17 + 24$
3. How much tax at 13% is there on a \$5 book?
4. What is the measure of the third angle of a right triangle with an angle of 50° ?
5. One week, it rained 16 mm in Winnipeg. The second week, it rained 5 mm and the third week, it rained 9 mm. How many millimetres did it rain on average each week in Winnipeg over the 3 weeks?
6. Write the expression that corresponds to the sum of m cubed and m .

Answers

178 students

7

\$0.65

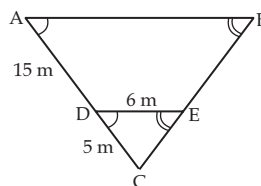
40°

10 mm

$m^3 + m$

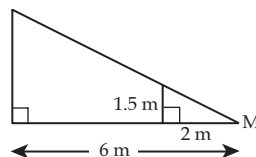
Unit Questions

7. Find the length of side AB.



24 m

8. You measure 1.5 m in height and your shadow is 2 m long. A tree's shadow is 6 m long. Find the height of the tree.



4.5 m

9. Any two squares are similar. True or false?
10. Two hexagons can be similar if one hexagon is regular and the other is not. True or false?

True

False

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

F-1

Substrand: Transformations

Specific Learning Outcome: 9.SS.4

General Questions	Answers
1. Add: $-12.4 + 3.1$	-9.3
2. If 19 out of 20 students obtained at least $\frac{15}{30}$ on the last mathematics test, what percentage of students obtained at least 50% on the test?	95%
3. What is the price of a \$50 soccer ball after a 20% discount?	\$40
4. Sonia works in a restaurant and prepares an average of 15 steaks per hour. How many steaks will she prepare in 6 hours?	90 steaks
5. Kamal paid \$63 for a pair of jeans. Arielle bought the same pair for \$25 less. How much did Arielle pay?	\$38
6. What is 5% of \$780?	\$39
Unit Questions	
7. A square garden with a perimeter of 24 m is drawn on a scale of 1:300. What is the perimeter of the drawing of the garden?	8 cm
8. On a coordinate plane, the vertex of a polygon is drawn at $(-2, 6)$. What are the coordinates of the vertex if the drawing is enlarged by a factor of 2?	$(-4, 12)$
9. A pentagon is reproduced with a scale of 3:2. If one side of the pentagon is 6 cm, what is the measure of the corresponding side of the reproduced pentagon?	9 cm
10. An equilateral triangle with sides equal to 22 cm is drawn so that its sides measure 11 cm. What scale factor was used?	1:2
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

F-2

Substrand: Transformations

Specific Learning Outcome: 9.SS.4

General Questions

1. What is the total cost of 5 towels at \$4.40 each?
2. What is the area of a rectangular patio measuring 7 m by 5 m?
3. What is the price of one hamburger if 8 cost \$40?
4. Simplify: $5m(3 + m)$
5. A factory, open 7 days per week, manufactures 10 boats per day. How many boats can it make in 12 weeks?
6. Nine out of 30 students are enrolled in a volunteer program overseas. What percentage of students is this?

Answers

\$22

35 m^2

\$5

$15m + 5m^2$

840 boats

30%

Unit Questions

The vertices of a geometric figure are $D(0, 0)$, $E(-2, 4)$, $F(-2, -2)$, and $G(6, 2)$. Use these coordinates to answer questions 7 to 10.

7. What are the coordinates for vertices D and E if the figure is reproduced on a scale of 1:2?
8. What are the coordinates for F and G if the figure is expanded by a factor of 3?
9. What scale is used if point E is reproduced with coordinates $(-8, 16)$?
10. Describe the relationship between the size of the original and the new figure described in question 9.

$D(0, 0)$
 $E(-1, 2)$

$F(-6, -6)$
 $G(18, 6)$

4:1

enlarged 4
times

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

F-3

Substrand: Transformations

Specific Learning Outcome: 9.SS.4

General Questions

1. Evaluate: 50^2
2. Express $2\frac{3}{4}$ as a decimal number.
3. How much will each person receive if \$39 is divided equally among three people?
4. Two out of 30 students in your class have an after-school job. What fraction of students does that represent?
5. Calculate the GST (5%) on a \$62 bill.
6. If the balance of your savings account is \$46 and you deposit a cheque for \$235, what is the new balance?

Answers

2500

2.75

\$13

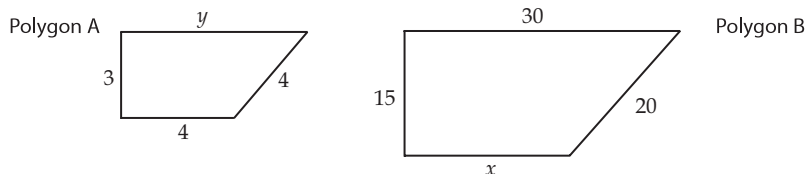
$\frac{1}{15}$

\$3.10

\$281

Unit Questions

To answer questions 7 to 10, use the diagrams of the similar polygons shown below.



7. What scale is used if Polygon B is transformed to become Polygon A?
8. What scale is used if Polygon A is transformed to become Polygon B?
9. Find the value of x .
10. Find the value of y

1 : 5

5 : 1

20

6

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

F-4

Substrand: Transformations

Specific Learning Outcome: 9.SS.5

General Questions

1. How long is a film in hours if it lasts 105 minutes?
2. If a piece of candy costs 25¢, how many pieces can you buy with \$7?
3. Ralph was born in November 1929. How old was he when he became a grandfather in 1985?
4. If you make a purchase for \$5.82 and pay with a \$20 bill, how much change will you receive?
5. Reduce the fraction $\frac{8}{10}$.
6. Find the perimeter of a rectangle with a length of 16 m and a width of 12 m.

Answers

$1\frac{3}{4}$ or
1.75 hours

28 pieces

56 years old

\$14.18

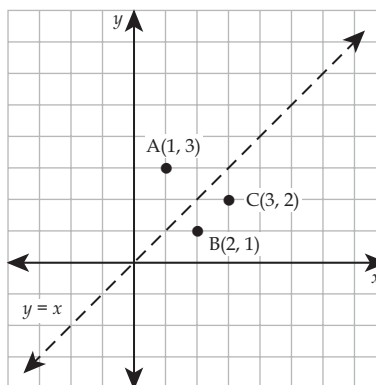
$\frac{4}{5}$

56 m

Unit Questions

For questions 7 to 10, determine the coordinates for the requested point after the given transformation. Use the diagram shown below.

7. Point A: Reflection over the x -axis.
8. Point A: Reflection over the y -axis.
9. Point B: Reflection over the y -axis.
10. Point C: Reflection over the line $y = x$.



(1, -3)

(-1, 3)

(-2, 1)

(2, 3)

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

F-5

Substrand: Transformations

Specific Learning Outcome: 9.SS.5

General Questions

1. What is the cost of 5 milkshakes at \$1.99 each?
2. A playlist contains 12 songs for a total length of 59 minutes. Estimate the average length of each song.
3. What is smaller: \$100 or 20% of \$400?
4. What is the surface area of a cube with a 2 cm edge?
5. What is the value of d in $20 = 4d + 8$?
6. You started with \$43, and spent \$19 on dinner. How much money do you have left?

Answers

\$9.95

≈ 5 minutes

20% of 400

24 cm^2

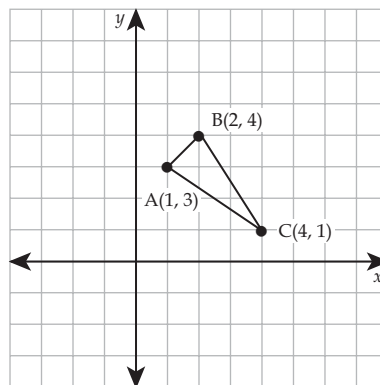
3

\$24

Unit Questions

What are the coordinates of the given point after the requested rotation with respect to the origin? Use the diagram below.

7. Point A: 90° clockwise
8. Point B: 180°
9. Point C: 90° counter-clockwise
10. Point A: 360°



(3, -1)

(-2, -4)

(-1, 4)

(1, 3)

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

F-6

Substrand: Transformations

Specific Learning Outcome: 9.SS.5

General Questions

1. What number is 5 times larger than 52?
2. How many servings of 250 g can you make out of 6.25 kg of tomato soup?
3. If Ashley works 50 hours at an hourly rate of \$9, what is her gross income?
4. Your cellphone plan includes 720 minutes of talk time per month. If you use an average of 30 minutes per day in the month of June, on how many minutes will you have to pay additional fees?
5. Write an expression that represents the sum of 8 and twice m .
6. Find the perimeter of an equilateral triangle if each side measures 12 mm.

Answers

260

25 servings

\$450

180 minutes

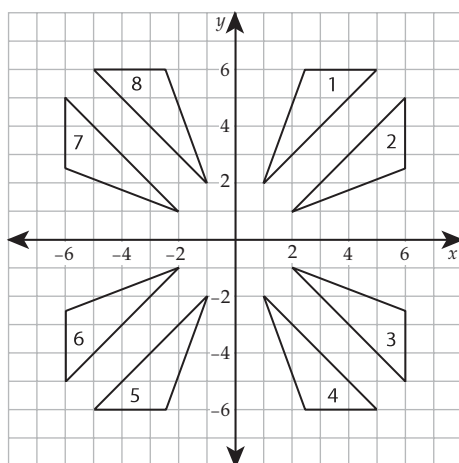
$8 + 2m$

36 mm

Unit Questions

Using the diagram below, describe the transformations that allow Triangle 1 to be moved to the position of:

7. Triangle 3
8. Triangle 4
9. Triangle 5
10. Triangle 8



rotate clockwise 90° about the origin

reflect over the x -axis

rotate 180° about the origin or reflect over the x -axis and the y -axis

reflect over the y -axis

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

F-7

Substrand: Transformations

Specific Learning Outcome: 9.SS.5

General Questions

1. You buy a bottle of vitamins for \$7.28 and oranges for \$4.30 to fight the flu. How much were your purchases?
2. How many rows of 20 are there in a room with 1000 seats?
3. What is the probability that you will flip a quarter that lands on tails?
4. What two integers have a sum of -8 and a product of 15?
5. What is the cost of a 17-minute telephone call if a minute costs 5¢?
6. How many kilograms are equivalent to 54 500 grams?

Answers

\$11.58

50 rows

$\frac{1}{2}$

-3 and -5

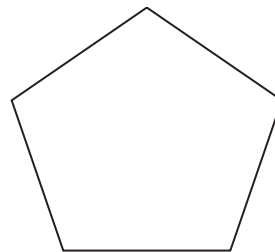
85¢

54.5 kg

Unit Questions

Use the regular pentagon shown below for questions 7 to 9. Determine

7. the number of lines of symmetry.
8. the order of rotation.
9. the angle of rotation.
10. Among the following letters of the alphabet, F, A, T, and X, which have no lines of symmetry?



5

5

72° or $\frac{1}{5}$ turn

F

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

G-1

Substrand: Data Analysis

Specific Learning Outcome: 9.SP.2

General Questions

1. You buy a shirt for \$16 and shoes for \$32. What is the total cost?
2. Your school planned a waterskiing trip and 10% of the 20 students in your class attended. How many students does that represent?
3. What is the greatest common divisor between 4, 8, and 12?
4. Calculate: $4 \times 14 \times 25$
5. Express $\frac{49}{8}$ as a mixed number.
6. Divide \$45 equally among 3 people. How much will each person receive?

Answers

\$48

2 students

4

1400

$6\frac{1}{8}$

\$15

Unit Questions

7. The part of a population that represents the whole population is called _____.
8. A collection of data received from an entire population is called _____.
9. If each member of a population has an equal chance of being chosen from a sample, the sample is _____.
10. A factor that can prevent a sample from representing a population is called _____.

a sample

a census

random

bias

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

G-2

Substrand: Data Analysis

Specific Learning Outcome: 9.SP.1

General Questions

1. Calculate 5% GST on \$16.
2. If the balance of your chequing account is \$74 and you deposit \$30, what is the new balance of your account?
3. How many centimetres are there is 4.5 metres?
4. Add: $\frac{1}{8}$ and $\frac{1}{2}$
5. How many minutes elapse between 8:00 a.m. and 11:30 a.m.?
6. Ten students out of 25 are missing from class. Express this as a percent.

Answers

\$0.80

\$104

450 cm

$\frac{5}{8}$

210 minutes

40%

Unit Questions

7. If you decide to interview 10% of 35 000 people, how many people will you interview?

3500 people

Name three effects that may be potential problems for data collection.

8. _____
9. _____
10. _____

bias, language, ethics, cost, time, confidentiality, and cultural difference

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

G-3

Substrand: Data Analysis

Specific Learning Outcome: 9.SP.1

General Questions	Answers
1. Evaluate: $-92 + 4$	-88
2. Write an expression that represents 5 less than n .	$n - 5$
3. If Julie spends 20 minutes on the bus getting to school, how many minutes does she spend on the bus in a typical week?	100 minutes
4. Add: $\frac{1}{2} + \frac{3}{4}$	$\frac{5}{4}$ or $1\frac{1}{4}$
5. What is the area of a rectangular classroom that measures 10 m by 12 m?	120 m^2
6. In your class of 20 students, 60% received a mark of 80% on a test. How many students does this represent?	12 students
Unit Questions	
For each statement, identify a factor that could influence the collection of data.	
7. The person does not understand what is required.	language
8. The person must answer all the questions.	privacy
9. The person must answer questions at noon exactly.	timing
10. The question implies a preference for a certain product.	bias
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

G-4

Substrand: Data Analysis

Specific Learning Outcome: 9.SP.1

General Questions

1. What is the square of 8?
2. What is one-half of 5.2?
3. If you get $\frac{17}{20}$ on a mathematics test, what is your mark as a percentage?
4. If Nadia earns \$85 per week, how much money will she make for 2 weeks of work?
5. If you have six 25¢ pieces, and fourteen 10¢ pieces, how much money do you have?
6. Evaluate: $0 \div 10$

Answers

64

2.6

85%

\$170

\$2.90

0

Unit Questions

Identify a factor that may influence the collection of data.

7. Asking teenagers what clothes they bought in a high-end retail store.
8. Asking someone to give their telephone number.
9. A vendor asks you about the income of your parents.
10. The survey is intended solely for those who live in Winnipeg.

high cost

confidentiality

confidentiality

cultural
difference

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

G-5

Substrand: Data Analysis

Specific Learning Outcome: 9.SP.1

General Questions	Answers
1. A can of paint can cover an area of 3.2 m^2 , which is 20% of the area to be painted. How many cans of paint are needed to paint the whole surface?	5 cans
2. Write $5\frac{2}{5}$ as a decimal.	5.4
3. How many centimetres are equivalent to 23 mm?	2.3 cm
4. What percentage of time is represented by the last 30 minutes of a 2-hour film?	25%
5. With twelve \$5 bills, how much money do you have?	\$60
6. What is the total cost of 3 chocolate bars at 99¢ each?	\$2.97
Unit Questions	
7. Name two factors that may cause a surveyor to use a sample rather than a population.	expensive, time consuming, human resources needed
8. To determine students' favourite course, a fine arts class was surveyed and 90% of the students indicated that art was their favourite course. What is a factor that may influence the data?	bias
9. Did question 8 use a sample or a population?	sample
10. In Ontario, 35% of secondary students are vegetarians. What population is the focus of the survey?	students in secondary school in Ontario
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

G-6

Substrand: Data Analysis

Specific Learning Outcome: 9.SP.1

General Questions

1. If $\frac{3}{4}$ of 16 students have brown eyes, how many students have brown eyes?
2. Write $1\frac{1}{4}$ in decimal form.
3. If two angles of a triangle measure 15° and 70° , what is the third angle measurement?
4. If you make a purchase of \$7.40 and pay with a \$10 bill, how much change will you receive?
5. How many kilometres can you drive in 8 hours going 90 km/hour?
6. Evaluate: $2^2 + 3^2 + 4^2$

Answers

12 students

1.25

95°

\$2.60

720 km

29

Unit Questions

7. Why is a census **not** done every year?
8. Veronica asks questions of random people she meets at the mall. Are these people a sample or a population?
9. Name a disadvantage of Veronica's questioning technique.
10. If Veronica poses her questions only to teenagers, what problems might she have with the data?

expensive, time consuming

sample

there may be neighbourhood bias

the data may be biased toward a specific age group

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

G-7

Substrand: Data Analysis

Specific Learning Outcome: 9.SP.2

General Questions	Answers
1. Express $\frac{9}{10}$ as a percentage.	90%
2. If tickets are \$20, how many can you buy with \$2000?	100 tickets
3. If you want to leave a 10% tip on your \$39.81 bill, estimate the total of your bill with the tip.	\approx \$44
4. Evaluate: $5 + 7 \times 9$	68
5. If Mario Lemieux was born in 1965, what age was he when he scored 89 goals in 1989?	\approx 24 years
6. How many hours is a 150-minute movie?	2.5 hours
Unit Questions	
Determine the sample type described in questions 7 to 10.	
7. Choosing an individual or group because it is easy to question them is a _____.	convenience sample
8. When individuals volunteer to answer a survey it's a _____.	voluntary sample
9. A _____ is used when we take one person for every "n" people in an ordered list of a population.	systematic sample
10. When selecting all individuals from a group we are sampling a _____.	population
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

G-8

Substrand: Data Analysis

Specific Learning Outcome: 9.SP.2

General Questions

1. Leo read 82 pages of a 200-page novel. How many pages are left?
2. A 13% tax is charged on a \$20 movie. How much money will you pay in tax?
3. It is 4:00 p.m. What is the angle between the clock hands?
4. What is the perimeter of a rectangular desk that measures 80 cm by 70 cm?
5. Estimate the sale price of a \$50.30 book after a 10% discount.
6. Multiply: 300×20

Answers

118 pages

\$2.60

120°

300 cm

$\approx \$45$

6000

Unit Questions

Identify the sampling technique used to gather information about students in a high school.

7. You ask one person in five passing through the hallway.
8. You ask all your friends.
9. You ask those who put up their hand when you ask a question.
10. You ask 10 random students from each grade in the school, 5 girls and 5 boys.

systematic

convenience

voluntary

stratified

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

G-9

Substrand: Data Analysis

Specific Learning Outcome: 9.SP.2

General Questions

1. If $\frac{4}{5}$ of the student population goes to school by bus, what percentage is this?
2. Jessica has \$128 in her savings account, but withdraws \$60. What is the new balance?
3. How many hours are equivalent to 240 minutes?
4. Evaluate: $3 \times 2 + 4 \div 2$
5. If you travel at a speed of 20 km for 3 hours, how far did you travel?
6. Reduce the fraction $\frac{10}{12}$.

Answers

80%

\$68

4 hours

8

60 km

$\frac{5}{6}$

Unit Questions

Jason, a member of the Graduation Committee, asked every third student who entered the cafeteria the following question, "What should be the colour of the cafeteria walls?"

7. Identify the population.
8. Identify the sample.
9. Identify the sampling technique.
10. The sampling technique is valid. True or false?

school members

students who use the cafeteria

systematic sample

True

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

H-1

Strand: Chance and Uncertainty

Specific Learning Outcome: 9.SP.4

General Questions	Answers
1. Evaluate: $5 + 3 \times 2$	11
2. How much do you save if the price of a \$42 hockey stick is reduced by 20%?	\$8.40
3. How many bags that hold 5 apples each could you fill with 325 apples?	65 bags
4. What is Robert's grade point average if he received 60% in mathematics, 50% in French, and 70% in social studies?	60%
5. Multiply: 25×11	275
6. Louis Saint-Laurent became prime minister of Canada in 1948 at the age of 66. In what year was he born?	1882
Unit Questions	
7. When tossing a coin, what is the probability of it showing heads?	$\frac{1}{2}$ or 0.5
8. What is the probability of rolling an even number with a normal, six-sided die?	$\frac{3}{6}$ or 0.5
9. What is the probability of rolling a 3 with a normal, six-sided die?	$\frac{1}{6}$
10. If 70 people have green eyes out of a group of 200, what is the probability of choosing a person with green eyes from the group?	35% or 0.35
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

H-2

Substrand: Chance and Uncertainty

Specific Learning Outcome: 9.SP.4

General Questions

1. Sarah was absent 20% of the time over the past 15 days. How many days did she miss over the course of this period?
2. Evaluate: $(2)(2)(2)(2)(2) + 2$
3. What is the sale price of a \$25 shelf reduced by 20%?
4. On one assignment, 15 out of 20 students used a calculator when they did their homework. What fraction of students does this represent?
5. If you work 20 hours at an hourly wage of \$11, what is your total revenue earned?
6. Multiply: $\frac{3}{8} \times \frac{5}{2}$

Answers

3 days

34

\$20

$\frac{3}{4}$

\$220

$\frac{15}{16}$

Unit Questions

7. Write the probability of rolling a 2 or a 5 with a normal, six-sided die.

$\frac{2}{6}$ or $\frac{1}{3}$

For questions 8 to 10, use the statement, "Out of the fifty cars parked in the parking lot, twenty are white."

8. What is the probability of a car on the road being white?
9. Is it a theoretical probability or an experimental probability?
10. What percent of cars in the parking lot are not white?

$\frac{2}{5}$ or 0.40

experimental

60%

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

H-3

Substrand: Chance and Uncertainty

Specific Learning Outcome: 9.SP.4

General Questions

1. Evaluate: $17 \times 2 + 150$
2. The altitude of Volcano Guallatiri in Chili is 6060 m. Express this altitude in km.
3. How many days are there from July 1st to September 30th?
4. Write the expression that corresponds to 5 less than x .
5. Which is the better price per ticket: 5 concert tickets for \$50 or 4 concert tickets for \$38?
6. Estimate the GST (5%) on a purchase of \$79.

Answers

184

6.06 km

92 days

$x - 5$

4 for \$38

$\approx \$4.00$

Unit Questions

The kids from a community centre choose either soccer or baseball. Here are the results of their registrations.

	Soccer	Baseball
Girls	15	35
Boys	30	20

7. How many kids are registered in total from the community centre?
8. What is the theoretical probability of a random soccer registration being a girl?
9. What is the experimental probability of a community centre girl playing soccer?
10. What is the experimental probability of a community centre kid playing soccer?

100 kids

50%

30%

45%

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

H-4

Substrand: Chance and Uncertainty

Specific Learning Outcome: 9.SP.4

General Questions

1. Evaluate: $24 + (7 \times 4)$
2. Add the number of days in a leap year with the number of days in a non-leap year.
3. If you pay a bill of \$8.88 with a \$20 bill, how much change will you get back?
4. What is the area of a volleyball court that measures 9 m by 40 m?
5. A badminton racquet that regularly costs \$82 is being sold for \$41. What is the percentage of the price reduction?
6. What number satisfies the equation $8 + m = -3$?

Answers

52

731 days

\$11.12

360 m^2

50%

$m = -11$

Unit Questions

There are three students running for student council president in an election: Kyle, Scott, and Laura. If 300 students voted and 40% chose Kyle, 30% chose Scott, and the rest chose Laura, then

7. what is the theoretical probability of choosing Scott if votes are random?
8. how many students chose Laura?
9. how many students did not choose Kyle?
10. what is the experimental probability that a student chose Scott?

$\frac{1}{3}$ or $33.\bar{3}\%$

90 students

180 students

30% or $\frac{3}{10}$

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

H-5

Substrand: Chance and Uncertainty

Specific Learning Outcome: 9.SP.4

General Questions	Answers
1. One-quarter of 20 students from your gym class did not have their gym shoes in the last class. What percentage of students does this represent?	25%
2. What is the perimeter of a rectangular lot that measures 60 m by 200 m?	520 m
3. Estimate the value of $\sqrt{6420}$.	≈ 80
4. Calculate a tip of 10% on a bill of \$64.40?	\$6.44
5. How many millimetres are equal to 32.6 cm?	326 mm
6. One day, Jonah painted $\frac{1}{4}$ of his kitchen. The next day, he painted another quarter of his kitchen. What fraction of his kitchen still needs to be painted?	$\frac{1}{2}$
Unit Questions	
7. A baseball player obtained 9 hits on 27 attempts at bat. Express his probability to the nearest thousandth.	0.333
8. You throw a nickel ten times and you receive heads 7 out of 10 times. This is an example of _____ probability.	experimental
9. What is the theoretical probability of flipping heads when a nickel is thrown 10 times?	5 out of 10 or $\frac{1}{2}$
10. When tossing a coin, what can be done to have the experimental probability more reliably approximate the theoretical probability?	increase the number of tosses
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

H-6

Substrand: Chance and Uncertainty

Specific Learning Outcome: 9.SP.4

General Questions

1. How many packages containing 3 boxes of juice would you have to buy to give one box to each of 210 people?
2. Add: $\frac{1}{2} + \frac{1}{3}$
3. There are 25 chickens and 20 rabbits on a farm. How many legs are there?
4. If you buy a shirt for \$24 and a pair of pants for \$38, what is the total amount of your purchase?
5. How many kilometres are equivalent to 41 200 m?
6. What is the next number: 51, 46, 41, 36, ___?

Answers

70 packages

$\frac{5}{6}$

130 legs

\$62

41.2 km

31

Unit Questions

7. Why is it more probable for someone's birthday to be in January than in February?
8. All probabilities can be represented as decimal numbers between ___ and ___.
9. The lotto 649 gives a probability of $\frac{1}{200}$ to win \$100. The lotto MAX gives a probability of $\frac{1}{175}$ to win \$100. Which lotto gives you a better chance to win?
10. What is the probability of an event that you are certain will happen?

There are more days in January.

0 and 1

lotto MAX

1 or 100%

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

I-1

Strand: Number Review

Specific Learning Outcomes: 9.N.1 and 9.N.2

General Questions or Review Relating to the SLOs	Answers
Evaluate:	
1. 2^5	32
2. 3^0	1
3. -1^4	-1
4. $2^3 + 3^2$	17
5. $4^3 - 5^2$	39
6. Write the following as a power: $3 \times 3 \times 3 \times 3$	3^4
Simplify to a single power:	
7. $3^4 \times 3^5$	3^9
8. $\frac{5^{13}}{5^7}$	5^6
9. $(4^3)^2$	4^6
10. $(5^3)(5^0)$	5^3
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

I-2

Strand: Number Review

Specific Learning Outcomes: 9.N.1 and 9.N.2

General Questions or Review Relating to the SLOs

Answers

Simplify to a single power:

1. $9^2 \times 9^5$

9^7

2. $(5^3)^4$

5^{12}

3. $4^3 \times 4^5$

4^8

4. $\frac{8^{10}}{8^6}$

8^4

Evaluate:

5. $(-2)^3$

-8

6. $-(3)^4$

-81

7. $(-4)(-4)(-4)$

-64

8. $\frac{4^0 \times 2^3}{2}$

4

9. $\frac{3^2 + 2^0}{5}$

2

10. $\frac{8^2}{4^3}$

1

Other Questions

11.

12.

Mental Math

I-3

Grade 9 Mathematics (10F)

Strand: Number Review

Specific Learning Outcomes: 9.N.3 and 9.N.4

General Questions or Review Relating to the SLOs

1. Place in ascending order: $\frac{3}{4}$, $\frac{2}{5}$, $\frac{4}{6}$

2. What is the decimal number that corresponds to $0.8 + \frac{3}{4}$?

3. The fraction $\frac{35}{4}$ is between which two consecutive whole numbers?

Answers

$\frac{2}{5}$, $\frac{4}{6}$, $\frac{3}{4}$

1.55

8 and 9

For questions 4 and 5, place numbers in descending order.

4. $\frac{32}{4}$, 8^0 , 2^4

5. -0.8 , $-\frac{4}{7}$, -0.2

2^4 , $\frac{32}{4}$, 8^0

-0.2 , $-\frac{4}{7}$, -0.8

Evaluate:

6. $3 + 2^3$

7. $(7^0 + 3^2)^2$

8. $\frac{4 + 2^3}{6}$

9. $(-3)(4^2 + 2^0)$

10. $\frac{2^5}{4^2} - 5^0$

11

100

2

-51

1

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

I-4

Strand: Number Review

Specific Learning Outcome: 9.N.5

General Questions or Review Relating to the SLO

Answers

Evaluate:

- $\sqrt{\frac{25}{16}}$
- $\sqrt{\frac{4}{9}} + \frac{\sqrt{25}}{3}$
- $\sqrt{3^4}$
- $(\sqrt{10^2}) \div 10$
- $-\sqrt{64}$
- Which numbers are not perfect squares: 4, 89, 121, 256, 1000?
- The square root of a number is 15. What is the number?
- What is the number if the square root is 14?
- The product of two numbers is 36. What is the product of their square roots?
- Evaluate: $(\sqrt{36} - \sqrt{16})^2$

$\frac{5}{4}$

$\frac{7}{3}$

9

1

-8

89 and 1000

225

196

6

4

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

I-5

Strand: Number Review

Specific Learning Outcomes: 9.N.1 to 9.N.6

General Questions or Review Relating to the SLOs	Answers
For questions 1 to 4, estimate the value.	
1. $\sqrt{9.2 \times 3.9}$	≈ 6
2. $\sqrt{\frac{145}{9}}$	≈ 4
3. $\sqrt{0.17}$	≈ 0.4
4. $\sqrt{50}$	≈ 7
5. The square of 6.1 is close to what whole number?	37
Evaluate:	
6. $9^2 - 4^3$	17
7. $\frac{3 \times 3 \times 3 - 5 \times 5}{2^0}$	2
8. $\sqrt{\frac{5^4}{25}}$	5
9. $\frac{(7^2)^2}{49} + 1$	50
10. $\sqrt{12 \times 10 + 3^0}$	11
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

I-6

Substrand: Patterns Review

Specific Learning Outcomes: 9.PR.1 and 9.PR.2

General Questions or Review Relating to the SLOs

Answers

Find the next term in the following patterns.

1. 28, 31, 34, _____

37

2. 23, 16, 9, _____

2

Susan initially owes her neighbour \$5.00. She rakes their lawn and is paid \$3 per hour. Using the graph of this scenario shown below, answer questions 3 to 7.

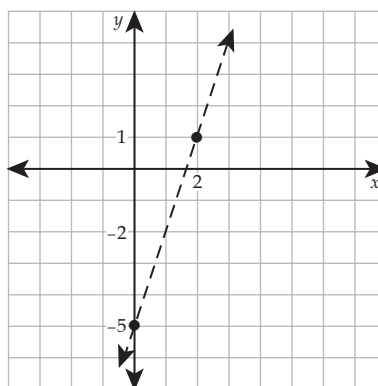
3. What is x when y is equal to 1?

4. How much does the value of y increase when the value of x increases by 1?

5. What is y when x is equal to 3?

6. What is y when x equals 0?

7. What is x when y is equal to -2 ?



2

3

4

-5

1

8. Saad is 5 years younger than three times the age of Natasha. What is the age of Saad if Natasha is 3 years old?

4 years old

9. Complete the pattern: 7, 14, 21, _____

28

10. You can represent the pattern 9, 16, 25, 36, . . . , using a linear equation? True or false?

False

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

I-7

Substrand: Patterns Review

Specific Learning Outcomes: 9.PR.1 and 9.PR.2

General Questions or Review Relating to the SLOs

1. If $y = x + 3$, what is the value of y if $x = 3$?
2. If $y = 3x - 2$, what is the value of x if $y = 13$?
3. If $y = 5x + 3$, what is the value of y if $x = 4$?

Use the table for questions 4 to 10. The variable h represents the number of hours of work and the variable s is the salary.

h	0	7	10	25
s	0	56	80	200

4. If $h = 15$, what is s ?
5. If $s = 64$, what is h ?
6. If $h = 30$, what is s ?
7. If $s = 800$, what is h ?
8. What is the hourly rate of pay?
9. How many hours of work correspond to a salary of \$888?
10. What would be the salary equivalent to 8 hours of work each day for 5 days?

Other Questions

11.

12.

Answers

6

5

23

120

8

240

100

\$8/hour

111 hours

\$320

Mental Math

Grade 9 Mathematics (10F)

I-8

Substrand: Variables and Equations Review

Specific Learning Outcome: 9.PR.3

General Questions or Review Relating to the SLO

Answers

Solve the following equations.

1. $5x = 20$

$x = 4$

2. $2x - 16 = 18$

$x = 17$

3. $3x - 5 = x + 7$

$x = 6$

4. $3(x - 2) = 9$

$x = 5$

5. $6x = 16 + 2x$

$x = 4$

6. $\frac{1}{2}x = 8$

$x = 16$

7. $\frac{3}{4}x - 3 = 6$

$x = 12$

8. $\frac{8}{x} = 12$

$x = \frac{2}{3}$

9. $3x + 4 = 2(2x - 1)$

$x = 6$

10. $\frac{x}{2} + 1 = \frac{3x}{2} - 7$

$x = 8$

Other Questions

11.

12.

Mental Math

I-9

Grade 9 Mathematics (10F)

Substrand: Variables and Equations Review

Specific Learning Outcomes: 9.PR.3 and 9.PR.4

General Questions or Review Relating to the SLOs

Answers

Solve the following equations and inequalities.

1. $3x + 9 = 6$

$$x = -1$$

2. $\frac{3}{x} + \frac{2}{x} = 5$

$$x = 1$$

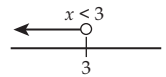
3. $\frac{1}{3}(m + 12) = \frac{2}{6}$

$$m = -11$$

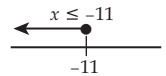
4. $\frac{x}{4} - \frac{7}{4} = \frac{1}{4}$

$$x = 8$$

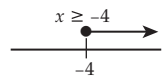
5. $3x < 9$



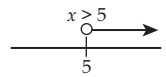
6. $2x - 3 \geq 3x + 8$



7. $2x + 6 \geq -2$



8. $5 - 3x < -10$



Write a linear inequality to represent the following.

9. Five chocolate bars cost more than \$12 and the cost of each bar is unknown.

$$5x > 12$$

10. Jean ran less than 18 km in 3 hours and his speed is unknown.

$$3x < 18$$

Other Questions

11.

12.

Mental Math

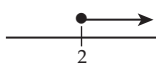
Grade 9 Mathematics (10F)

I-10

Substrand: Variables and Equations Review

Specific Learning Outcomes: 9.PR.4 and 9.PR.5

General Questions or Review Relating to the SLOs

- $x < 3$ is the general solution of the linear inequality $2x - 1 \leq x + 2$. True or false?
- The graph shown on the right is the general solution to the linear inequality $3 - 2x \leq 1 - x$. True or false?

- $x = 5$ is a solution to the linear inequality $3 - 2x \leq 1 - x$. True or false?
- $x = 4$ is a solution to the linear inequality $\frac{2}{3}x - 1 > 2$. True or false?

Answers

False

True

True

False

Respond to questions 5 to 10 concerning the polynomial $3x^2 - 2y^2 + 9$.

- What are the two variables in the polynomial?
- What is the coefficient of the variable y ?
- How many terms does the polynomial have?
- What is the exponent of the variable x ?
- What is the value of the constant?
- What is the coefficient of the variable x ?

x and y

-2

3

2

9

3

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

I-11

Strand: Variables and Equations Review

Specific Learning Outcome: 9.PR.6

General Questions or Review Relating to the SLO	Answers
Simplify the following polynomials for questions 1 to 4.	
1. $3x - 2x^2 + x - 3x^2$	$4x - 5x^2$
2. $4a^2 + 4 - 3a^2 - 1$	$a^2 + 3$
3. $m + 6 - 4 - 2m$	$-m + 2$
4. $5y - 3 + y^2 - 2y - 4y^2 + 5$	$-3y^2 + 3y + 2$
5. Write a polynomial of 4 terms equivalent to $2p - 5$.	Sample: $3p - p - 7 + 2$
Write an expression for the perimeter for questions 6 to 8.	
6. A rectangle that has a length of $5d + 2$ and a width of $3d - 1$.	$16d + 2$
7. The three sides of a triangle are w , $3w + 4$, and $4w - 2$.	$8w + 2$
8. The side of a square is $5x + 3$.	$20x + 12$
Simplify the following polynomials for questions 9 and 10.	
9. $(4x - 2) + (8x + 5)$	$12x + 3$
10. $(5m - 3) - (2m - 7)$	$3m + 4$
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

I-12

Substrand: Variables and Equations Review

Specific Learning Outcomes: 9.PR.6 and 9.PR.7

General Questions or Review Relating to the SLOs

Answers

Simplify the following polynomials for questions 1 to 3.

1. $(7c - 5) - (4c)$

$3c - 5$

2. $3x - (4 - 6x)$

$9x - 4$

3. $(y + 7) + (y^2 - 7)$

$y^2 + y$

Multiply the following monomials for questions 4 to 6.

4. $(3x)(-2x)$

$-6x^2$

5. $\frac{2}{3}t(3t)$

$2t^2$

6. $(-8y)(-3y)$

$24y^2$

Divide the following equations for questions 7 to 9.

7. $\frac{8x^2}{2x}$

$4x$

8. $(5xy) \div (5y)$

x

9. $(-12x^2) \div (4x)$

$-3x$

10. The area of a rectangle is $72t^2$ and its width is $12t$. What is its length?

$6t$

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

I-13

Substrand: Measurement Review

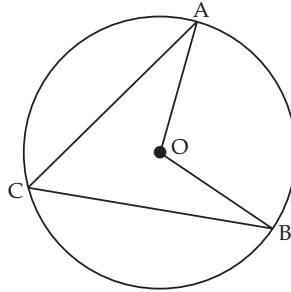
Specific Learning Outcome: 9.SS.1

General Questions or Review Relating to the SLO

Answers

For questions 1 to 3, point O is the centre of the circle.

- If $\angle AOB = 32^\circ$, what is the measure of $\angle ACB$?
- If $\angle ACB = 54^\circ$, what is the measure of $\angle AOB$?
- If $\widehat{ACB} = 320^\circ$, what is the measure of $\angle AOB$?



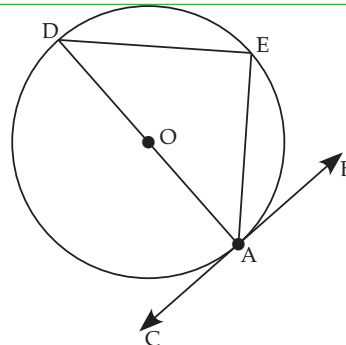
16°

108°

40°

For questions 4 to 7, CB is tangent to diameter AD at point A on the circle with centre O.

- What is the measure of $\angle BAD$?
- What is point A called?
- What is the measure of $\angle DEA$?
- What is arc DEA called?



90°

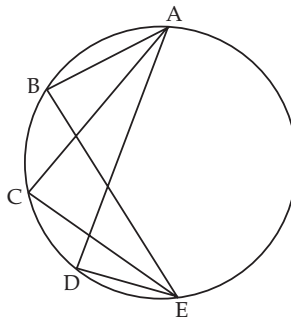
the tangent point

90°

semicircle

For questions 8 to 10, use the following figure.

- If $\angle ABE = 85^\circ$, what other angle measures do you know?
- What name is given to angles such as $\angle ABE$, $\angle ACE$, and $\angle ADE$?
- Complete the following sentence. $\angle ABE$ and $\angle ACE$ are congruent because they are subtended by _____.



$\angle ACE = 85^\circ$ and $\angle ADE = 85^\circ$

inscribed angle

the same arc

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

I-14

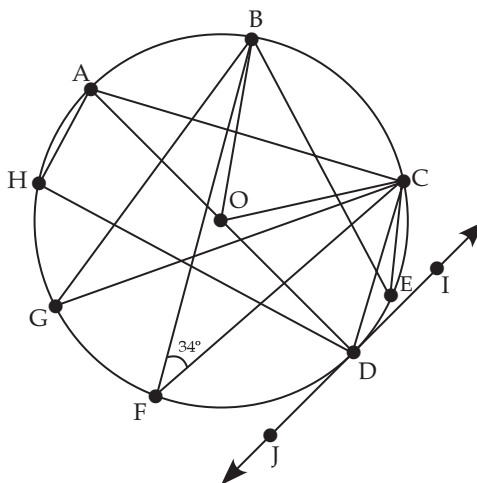
Substrand: Measurement Review

Specific Learning Outcome: 9.SS.1

General Questions or Review Relating to the SLO

Given the circle with centre O , diameter AD , tangent IJ , tangent point D , and the measure $\angle BFC = 34^\circ$, determine the measure of:

1. $\angle ADJ$
2. $\angle BGC$
3. $\angle BEC$
4. $\angle BOC$
5. $\angle ACD$
6. $\angle AHD$



Answers

90°

34°

34°

68°

90°

90°

Using the diagram above, give an example of

7. an inscribed angle of arc AH .
8. a central angle involving point B .
9. a radius.
10. $\angle AHD$ is subtended by an arc. What is the name of the arc?

$\angle ADH$

$\angle BOC$ and
 $\angle BOA$

$AO, BO, CO,$
or DO

\widehat{AD}

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

I-15

Substrand: 3-D Objects and 2-D Shapes Review

Specific Learning Outcome: 9.SS.3

General Questions or Review Relating to the SLO

Answers

Complete the phrase for questions 1 and 2.

1. If two triangles are similar, the corresponding angles are _____.
2. If two triangles are similar, measurements of corresponding sides are _____.
3. Any two triangles are similar. True or false?
4. Any two regular pentagons are similar. True or false?

congruent

proportional

False

True

Calculate the missing value for questions 5, 6, and 7.

5. $\frac{x}{4} = \frac{6}{24}$

1

6. $\frac{2}{x} = \frac{8}{12}$

3

7. $\frac{5}{3} = \frac{25}{x}$

15

8. Why are all rectangles not similar?

Corresponding sides may not be proportional.

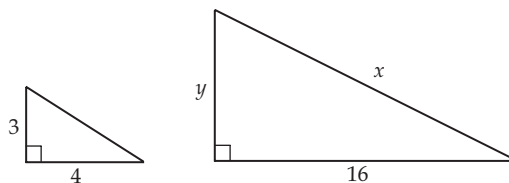
Use the two similar triangles shown for questions 9 and 10 to evaluate y and x .

9. y

12

10. x

20



Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

I-16

Substrand: Transformations Review

Specific Learning Outcome: 9.SS.4

General Questions or Review Relating to the SLO

1. A square is redrawn in a ratio of 2:1. If the sides of the first square measure 8 cm, what is the measure of the sides of the second square?
2. The side of a 12 cm rectangle was reduced so that its side measures 8 cm. What scale factor was used?
3. A figure has a perimeter of 18 inches. If this figure is enlarged on a scale of 5:3, what will be the perimeter of the new figure?
4. A figure with a 10 cm perimeter is initially enlarged according to a scale of 3:2 and then reduced with a scale of 2:3. What is the perimeter of the new figure?

Answers

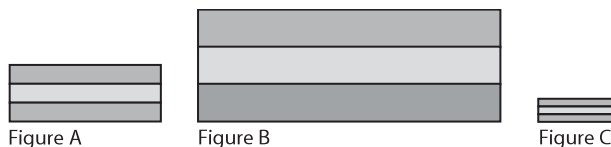
16 cm

$\frac{2}{3}$

30 inches

10 cm

Use Figures A, B, and C for questions 5 to 8.



5. Estimate the scale factor used to transform Figure A to Figure B.
6. What is the scale factor used to transform Figure B to Figure A?
7. Estimate the scale factor to transform Figure A to Figure C.
8. Estimate the scale factor used to transform Figure C to Figure B.

2

$\frac{1}{2}$

0.5 or $\frac{1}{2}$

4

For questions 9 and 10, four identical squares can be placed in a large square.

9. What is the scale factor used to transform a small square to the large square?
10. If one side of the large square measures 20 cm, what is the measure of a side of a small square?

2

10 cm

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

I-17

Substrand: Transformations Review

Specific Learning Outcome: 9.SS.5

General Questions or Review Relating to the SLO

Answers

Point A is $(4, -2)$. What would the coordinates of point A be after each of the requested transformations?

1. A reflection over the x -axis.
2. A reflection over the y -axis.
3. A reflection over the origin.

$(4, 2)$

$(-4, -2)$

$(-4, 2)$

Point B is $(3, 1)$. Find the new coordinates of point B after completing a rotation in relation to the origin with each of the following angles.

4. 90° clockwise
5. 180°
6. 90° counter-clockwise
7. 270° clockwise

$(1, -3)$

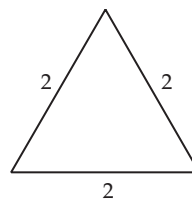
$(-3, -1)$

$(-1, 3)$

$(-1, 3)$

For the following figure, determine

8. the number of lines of symmetry.
9. the order of rotation.
10. the angle of rotation.



3

3

120°

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

I-18

Substrand: Data Analysis Review

Specific Learning Outcome: 9.SP.1

General Questions or Review Relating to the SLO

Answers

Identify the factor that would influence the results of data collection for questions 1 to 10.

1. The person must give their phone number.
2. The person must answer questions before 1 p.m.
3. The question demonstrates a preference for the product.
4. The sample is not representative of the population.
5. The person does not understand the questions.
6. The question refers to religion.
7. The question asks for judgment on a particular person.
8. A telephone survey takes more than 45 minutes.
9. The survey focuses on luxury cars.
10. The person must indicate in what country they were born.

privacy

time and
timing

a bias

a bias

use of
language

cultural
sensitivity

ethics

time and
timing

cost/bias

privacy

Other Questions

11.

12.

Mental Math

Grade 9 Mathematics (10F)

I-19

Substrand: Data Analysis Review

Specific Learning Outcomes: 9.SP.2 and 9.SP.3

General Questions or Review Relating to the SLOs	Answers
1. A sample is representative of a _____.	population
2. A census collects data from a _____.	population
For questions 3 to 6, determine whether you should use a <i>sample</i> or a <i>population</i>.	
3. A school wants to know what sport interests the students.	population
4. A pen factory wants to know if all pens are manufactured correctly.	sample
5. Pierre wants to know if teachers prefer to wear long-sleeve or short-sleeve shirts.	sample
6. A small organization wants to know the proportion of people in the organization who were born in Winnipeg and live in Winnipeg.	population
For questions 7 to 9, determine whether a sample or a population has been used.	
7. To determine the life of a light bulb, a company has randomly selected 150 light bulbs	sample
8. To determine the wishes of the student body, Marc asked everyone who was in the cafeteria which school president candidate they would vote for.	sample
9. To determine what technology to use with her class, a teacher asked her students if they had a cellphone.	population
10. Out of 2000 people, 450 were given a survey. This is a _____.	sample
Other Questions	
11.	
12.	

Mental Math

Grade 9 Mathematics (10F)

I-20

Substrand: Data Analysis Review

Specific Learning Outcome: 9.SP.4

General Questions or Review Relating to the SLO

1. In a class, 5 out of 20 students do not like chocolate. What is the probability that a person likes chocolate?
2. The probability of seeing a red car in Winnipeg is 0.40. How many red cars would you expect to see if there are 500 000 cars?
3. What is the probability of rolling a prime number with a regular 6-sided die?

Answers

$$\frac{3}{4} \text{ or } 0.75$$

200 000

$$\frac{3}{6} = \frac{1}{2}$$

For questions 4 to 7, describe the type of probability as theoretical or experimental in each of the scenarios.

4. After rolling a number cube (die) 6 times, Nadine says that the probability of rolling a 4 is $\frac{2}{6}$.
5. The probability of showing "heads" when flipping a coin is $\frac{1}{2}$.
6. By randomly surveying 100 people, it was determined that 15% of people have blue eyes.
7. The probability of drawing a green ball out of a bag that contains 1 green, 2 blue, and 1 yellow ball is 0.25.

experimental

theoretical

experimental

theoretical

For questions 8 to 10, there is 1 black ball and 3 white balls in a bag. Marc takes a ball, determines its colour, and puts it back in the bag.

8. What is the theoretical probability (as a percent) that he pulls a black ball on his first pull?
9. What is the theoretical probability (as a percent) that he pulls a white ball on his second pull?
10. If Marc picks a ball and replaces it, twice, and pulls 2 white balls, what is the experimental probability of pulling a white ball (as a percent)?

25%

75%

100%

Other Questions

11.

12.



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