

Name: _____

Math 60 **Practice** Exam 1

Part I: No Calculator

Show all your work so that:

- someone who wanted to know *how* you found your answer can clearly see how.
- if you make a mistake, I can see where it happened and determine how much partial credit you should be awarded.

You may use scratch paper, but all necessary work must be written on this exam. Simplify all fractions as much as possible. The entire exam is closed-note, closed-book. You may not use your calculator or any other electronic device on this part of the exam. Take your time, because you have plenty to spare. Check your answers ☺.

1. Calculate the following expressions. Make sure to simplify all fractions as much as possible.

a) $\frac{7}{8} - \frac{2}{5}$

b) $\frac{9}{11} + \frac{2}{3}$

c) $-\frac{12}{7} \div \left(-\frac{9}{28}\right)$

d) $\frac{15}{8} \left(-\frac{12}{35}\right)$

e) $3(2 - 4)^2 + \sqrt{16}$

f) $\frac{2 + 3(4 - 2)}{(2 + 3)^2}$

g) $24 - |12 - 20| \div 4 \cdot 2$

h) $3\sqrt{100 - 36} - (2 + 4 \div 2)$

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2. Insert $<$, $>$, or $=$ in the space provided to make each statement true. No work is required.

a) $-28 \square 9$

b) $-3.8 \square -4.1$

c) $\frac{2}{3} \square 0.\bar{6}$

d) $\frac{6}{5} \square 1.5$

e) $\left| -\frac{4}{5} \right| \square \frac{12}{15}$

f) $4 \square \sqrt{29}$

3. Determine if the following statements are true or false; circle either “True” or “False.”

True or False: All integers are whole numbers.

True or False: All whole numbers are rational numbers.

True or False: The number $\sqrt{35}$ is irrational.

True or False: The number $|-4.7|$ is rational.

True or False: The number $-\frac{5}{11}$ is an integer.

True or False: The number 0 is a natural number.

True or False: The number $\sqrt{4}$ is an integer.

True or False: The number $\sqrt{4}$ is a natural number.

True or False: The number $\sqrt{52}$ is less than 8.

True or False: The number $\sqrt{10}$ is greater than -4 .

True or False: The number $\frac{\pi}{3}$ is a real number.

True or False: The number $1.01001000100001\dots$ is a rational number.

4. State a number that is a rational number but not a natural number: _____

State a number that is a real number but not a rational number: _____

5. Evaluate the following expressions.

a) $2x^3 + 3x + 3$ for $x = -2$

b) $7 - 2Q^2 - Q$ for $Q = -5$

c) $\sqrt{36 - 5t} + t^2$ for $t = 4$

d) $\frac{|w - 10|}{w^2}$ for $w = -10$

6. Determine if -5 is a solution to each of the following equations. Give complete justification and clearly state if -5 is a solution or not.

a) $4 + 2(4x + 5) = 5x$

b) $2x^2 + (x + 3)^3 = -8x + 2$

c) $\frac{3}{4} - (x + 2) = -\frac{3}{4}x$

d) $\frac{3}{7}x + 1 = \frac{1}{2}x$

7. Solve the equations below. Include a check of your solution and state the solution set.

a) $Q + 1.3 = -51.2$

b) $t - \frac{1}{2} = \frac{4}{3}$

c) $x + 15 = 6$

d) $H + 12 = 108$

e) $4x = 56$

f) $-\frac{2}{3}x = 12$

g) $\frac{y}{7} = -3$

h) $\frac{x}{3.57} = 1$

8. Determine if 12 is a solution to each of the following inequalities. Give complete justification and clearly state if 12 is a solution or not.

a) $x + 8 \leq 20$

b) $x - 34 \geq 14$

c) $19 - 3x < -2x$

d) $3(x - 7)^2 > 6x$

9. Write the interval that represents all values for which:

a) $x > \pi$

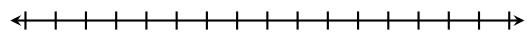
b) $x < \frac{3}{91}$

c) $x \geq 0$

d) $x \leq 23$

10. Solve each linear inequality below. Graph the solution set on a number line, and then write the solution set using an interval and set-builder notation.

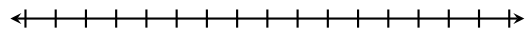
(a) $C - 13 \leq 5.2$



Interval Notation:

Set-Builder Notation:

(b) $-15t > -10$



Interval Notation:

Set-Builder Notation:

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Part II: Calculator Permitted

You may use a calculator (basic, scientific, or graphing), but may not use any other electronic device. Show all your work so that:

- someone who wanted to know *how* you found your answer can clearly see how.
- if you make a mistake, I can see where it happened and determine how much partial credit you should be awarded.

The calculator should only be used at the end of your problem-solving process, to calculate some decimal value. Where appropriate, round to three decimal places.

11. A pair of shoes purchased in Chicago had a list price of \$56.50. The city has an 10.25% sales tax.

(a) What was the amount of tax charged for this purchase?

(b) What was the total charge (including tax)?

12. The population of Portland increased by 7.7% between 2011 and 2016, growing to 639,863.

(a) By how many people did the population increase between 2011 and 2016?

(b) What was the population in 2011?

13. An oil change is marked down to \$17.50 from \$24.99. By what percent is the price discounted?

14. A pair of jeans is on sale for 30% off, and the sale price is \$15.19. What was the price before the sale and how many dollars difference is there?

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15. The relationship between degrees Celsius (C) and degrees Fahrenheit (F) is given by

$$C = \frac{5}{9}(F - 32)$$

Use this equation to convert 98.6°F to Celsius.

16. The energy, measured in microjoules, of an object of mass m , measured in kilograms, is given by

$$E = mc^2$$

where c is the speed of light, about 300,000 km/s. Use this equation to find the energy of a 2.32 kg object.

17. The volume of a sphere is given by $V = \frac{4}{3}\pi r^3$. Calculate the volume of a sphere can with a radius of 12.5 cm.

18. The volume of a cone is given by $V = \frac{1}{3}\pi r^2 h$. Calculate the volume of a cone with a radius of 1.4 ft and a height of 5.2 ft.

19. The area of a rectangle is 114.84 sq. inches and its width is 13.2 inches. What is the length of the rectangle?

20. The area of a triangle is 114.84 sq. inches and its base width is 13.2 inches. What is the height of the rectangle (with respect to that base)?

21. Jeff hires a contractor and has \$400 cash to pay the contractor when the work is complete. The rate is \$45 for each hour of labor. Write a linear equation representing how much time would pass when Jeff runs out of money to pay the contractor. Define the variable you use, including units.

22. For unclogging a drain, a plumber charges a flat fee of \$75 and \$50 for each hour of service. Write a linear inequality showing how many hours of service will keep the total bill under \$400. Define the variable you use, including units.

23. Including an 21% tip, the total charge for a party of 6 diners at a restaurant was \$173.03. Write a linear equation representing this scenario. (The charge before tip is the unknown quantity). Define the variable you use, including units.

8. a) You must substitute 12 for x and simplify each side. The result is $20 \leq 20$, which is true. So 12 is a solution. b) You must substitute 12 for x and simplify each side. The result is $-22 \geq 14$, which is false. So 12 is not a solution.
- c) You must substitute 12 for x and simplify each side. The result is $-17 < -24$, which is false. So 12 is not a solution. d) You must substitute 12 for x and simplify each side. The result is $75 > 72$, which is true. So 12 is a solution.
9. a) (π, ∞) b) $(-\infty, \frac{3}{91})$
 c) $[0, \infty)$ d) $(-\infty, 23]$
10. (a) Number line omitted. Interval notation: $(-\infty, 18.2]$. Set-builder notation: $\{C \mid C \leq 18.2\}$.
 (b) Number line omitted. Interval notation: $(-\infty, \frac{2}{3})$. Set-builder notation: $\{t \mid t < \frac{2}{3}\}$.
11. (a) The amount of tax is \$5.79.
 (b) The total charge is \$62.29.
12. (a) Portland grew by 45747 people between 2011 and 2016.
 (b) In 2011, the population of Portland was 594116.
13. The discount on the oil change is about 29.97%.
14. Before the sale, the jeans were priced at \$21.70.
15. 98.6°F is 37°C.
16. 2.32 kg has 208,800,000,000 microjoules of energy.
17. The volume of the sphere is about 8181 cubic cm.
18. The volume of the cone is about 5.337 cubic ft.
19. The length of the rectangle is 8.7 in.
20. The height of the rectangle is 17.4 in.
21. Let t be the number of hours of labor. $45t = 400$
22. Let t be the number of hours of labor. $75 + 50t < 400$
23. Let B be the bill total before the tip is added. $B + 0.21B = 173.03$