



# CAMI Mathematics: Grade 10

## GRADE 10 CAPS Curriculum

### 10.1 Functions

**1.1 Point by point plotting of basic graphs defined by  $y = x^2$ ,  $y = \frac{1}{x}$  and  $y = b^x$ ;  $b > 0$  and  $b \neq 1$ .**

(a) Complete the table to draw the graph of  $y = 2x^2$

X	-2	-1	0	1	2
y					

(b) Complete the table to draw the graph of  $y = -3x^2$

X	-2	-1	0	1	2
y					

(c) Complete the table to draw the graph of  $y = \frac{-24}{x}$

X	-6	-4	-1	1	4	6
y						

(d) Complete the table to draw the graph of  $y = \frac{12}{x}$

X	-6	-4	-1	1	4	6
y						

**1.2 Investigate the effect of  $a$  and  $q$  on the graphs defined by  $y = a.f(x) + q$  where  $f(x) = x$ ,  $f(x) = x^2$ ,  $f(x) = \frac{1}{x}$  and  $f(x) = b^x$ ,  $b > 0$ ,  $b \neq 1$ .**

(a) Complete the table to draw the graph of  $y = -x^2 + 2$

X	-2	-1	0	1	2
y					

(b) Complete the table to draw the graph of  $y = x^2 - 1$

X	-4	-3	0	3	4
y					

(c) Complete the table for  $y = \frac{8}{x} + 5$



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X	9	12	-1.6	-12	-9
y					

(d) Complete the table for  $y = \frac{-5}{x} - 1$

X	4	-5	-4
y			

(e) If  $y = \frac{10}{x-7} - 10$

- (1) What is the horizontal asymptote?
- (2) What is the vertical asymptote?
- (3) What is the x-intercept?
- (4) What is the y-intercept?
- (5) What is the domain?
- (6) What is the range?

(f) If  $y = \frac{-4}{x-6} + 4$

- (1) What is the horizontal asymptote?
- (2) What is the vertical asymptote?
- (3) What is the x-intercept?
- (4) What is the y-intercept?
- (5) What is the domain?
- (6) What is the range?

### 1.3 Point by point plotting of basic graphs defined by: $y = \sin \theta$ , $y = \cos \theta$ and $y = \tan \theta$ for $\theta \in [0^\circ; 360^\circ]$ .

(a) Complete the table and draw the graph if  $y = \tan \beta$

$\beta$	$0^\circ$	$45^\circ$	$90^\circ$	$135^\circ$	$180^\circ$	$225^\circ$	$270^\circ$	$315^\circ$	$360^\circ$
$\tan \beta$									

(b) Complete the table and draw the graph if  $y = \cos \beta$

$\beta$	$0^\circ$	$45^\circ$	$90^\circ$	$135^\circ$	$180^\circ$	$225^\circ$	$270^\circ$	$315^\circ$	$360^\circ$
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$\cos \beta$									
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(c) Complete the table and draw the graph if  $y = \sin \beta$

$\beta$	$0^\circ$	$45^\circ$	$90^\circ$	$135^\circ$	$180^\circ$	$225^\circ$	$270^\circ$	$315^\circ$	$360^\circ$
$\sin \beta$									

## 1.4 Study the effect of $a$ and $q$ on the graphs defined by:

$y = a \sin \theta + q$ ,  $y = a \cos \theta + q$  and  $y = a \tan \theta + q$  where  $a, q \in Q$  for  $\theta \in [0^\circ; 360^\circ]$

- (a) If  $y = 5 \sin \alpha$ , write down the amplitude and period.
- (b) If  $y = -2 \sin \alpha$ , write down the amplitude and period.
- (c) If  $y = 3 \cos \alpha$ , write down the amplitude and period.

## 1.5 Find the equations and /or the properties of the given graphs.

- (a) Calculate the following properties of  $y = 4x^2 - 64$ :
- (1) y-intercept
  - (2) x-intercept
  - (3) axis of symmetry
  - (4) Domain
  - (5) Range
- (b) Calculate the following properties of  $y = -x^2 + 4$ :
- (1) y-intercept
  - (2) x-intercept
  - (3) axis of symmetry
  - (4) Domain
  - (5) Range
- (c) Find the equation of the parabola  $y = ax^2 + q$  that passes through the points  $(-2;0)$  and  $(1;-6)$ .
- (d) Find the equation of the parabola  $y = ax^2 + q$  that passes through the points  $(3;0)$  and  $(4;-21)$ .
- (e) Find the equation of the hyperbola  $y = \frac{a}{x}$  that passes through the points  $(-5;-12)$ .



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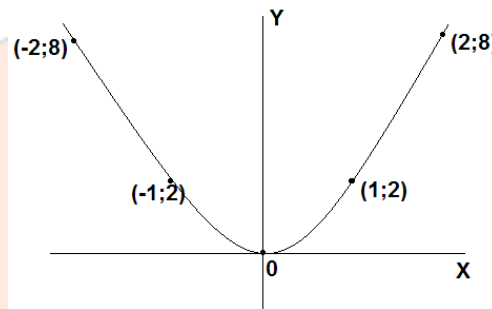
## MEMO

PLEASE NOTE: All the sketches are schematically and not according to scale.

### 1.1 Point by point plotting [6.4.1.1; 6.5.5.1; 6.5.5.2]

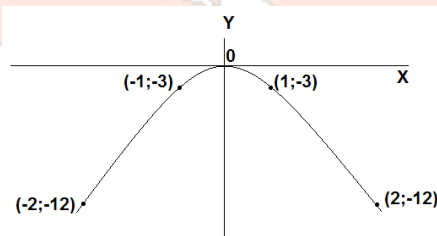
(a)  $y = 2x^2$

X	-2	-1	0	1	2
y	8	2	0	2	8



(b)  $y = -3x^2$

X	-2	-1	0	1	2
y	-12	-3	0	-3	-12

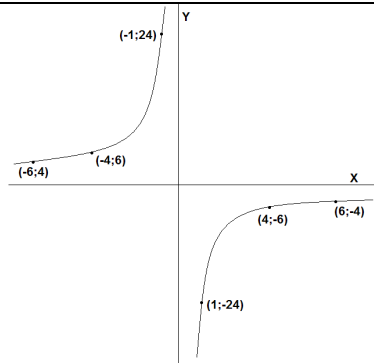


(c)  $y = \frac{-24}{x}$

X	-6	-4	-1	1	4	6
y	4	6	24	-24	-6	-4

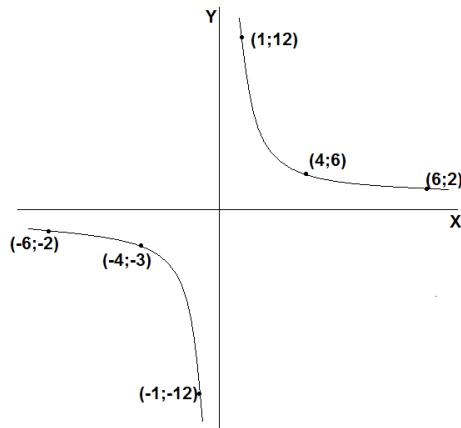


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(d)  $y = \frac{12}{x}$

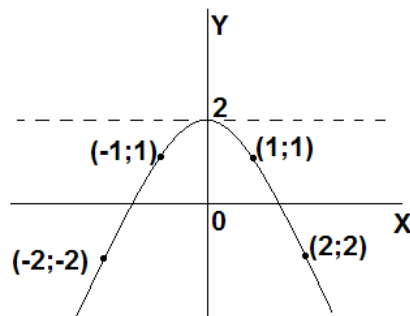
X	-6	-4	-1	1	4	6
y	-2	-3	-12	12	3	2



## 1.2 Effect of $a$ and $q$ [6.4.1.2; 6.5.5.3]

(a)  $y = -x^2 + 2$

X	-2	-1	0	1	2
y	-2	1	2	1	-2

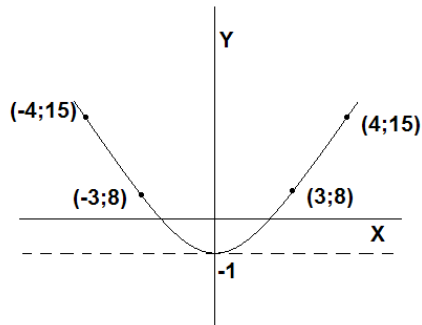




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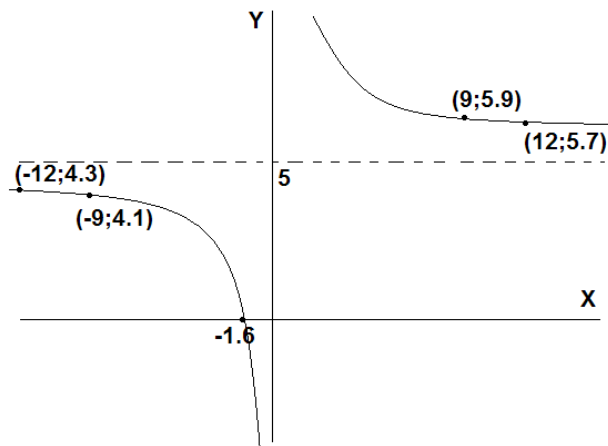
(b)  $y = x^2 - 1$

X	-4	-3	0	3	4
y	15	8	-1	8	15



(c)  $y = \frac{8}{x} + 5$

X	9	12	-1.6	-12	-9
y	5.9	5.7	0	4.3	4.1

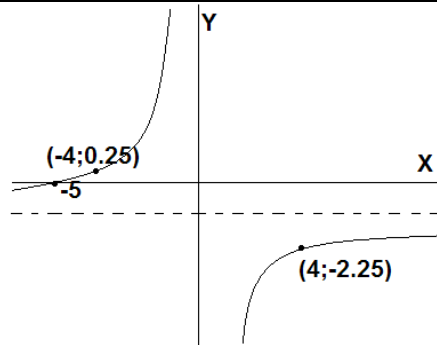


(d)  $y = \frac{-5}{x} - 1$

X	4	-5	-4
y	-2.25	0	0.25



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(e)  $y = \frac{10}{x-7} - 10$

- (1)  $y = -10$
- (2)  $x = 7$
- (3)  $(8 ; 0)$
- (4)  $(0 ; -11.4)$
- (5)  $x \in \mathbb{R}; x \neq 7$
- (6)  $y \in \mathbb{R}; y \neq -10$

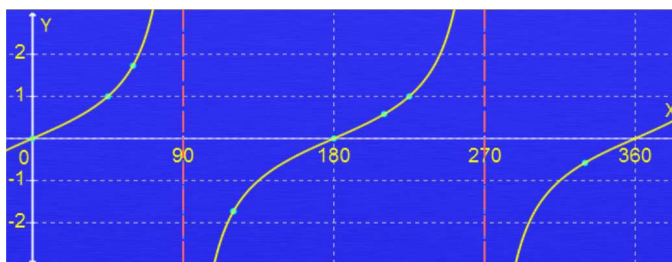
(f)  $y = \frac{-4}{x-6} + 4$

- (1)  $y = 4$
- (2)  $x = -6$
- (3)  $(7 ; 0)$
- (4)  $(0 ; 4.7)$
- (5)  $x \in \mathbb{R}; x \neq -6$
- (6)  $y \in \mathbb{R}; y \neq 4$

### 1.3 Point by point plotting [7.8.1.1; 7.8.1.2]

(a)  $y = \tan \beta$

$\beta$	$0^\circ$	$45^\circ$	$90^\circ$	$135^\circ$	$180^\circ$	$225^\circ$	$270^\circ$	$315^\circ$	$360^\circ$
$\tan \beta$	0	1	-	-1	0	1	-	-1	0

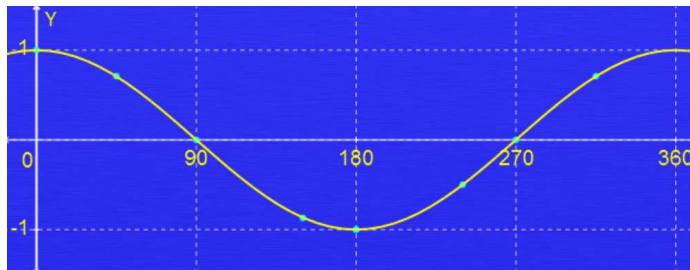




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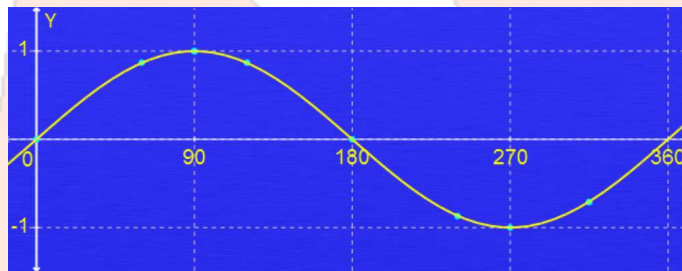
(b)  $y = \cos \beta$

$\beta$	$0^\circ$	$45^\circ$	$90^\circ$	$135^\circ$	$180^\circ$	$225^\circ$	$270^\circ$	$315^\circ$	$360^\circ$
$\cos \beta$	1	0.7	0	-0.7	-1	-0.7	0	0.7	1



(c)  $y = \sin \beta$

$\beta$	$0^\circ$	$45^\circ$	$90^\circ$	$135^\circ$	$180^\circ$	$225^\circ$	$270^\circ$	$315^\circ$	$360^\circ$
$\sin \beta$	0	0.7	1	0.7	0	-0.7	-1	-0.7	0



## 1.4 Effect of $a$ and $q$ [7.8.2.1; 7.8.2.2]

(a)  $y = 5 \sin \alpha$

Amplitude: 5

Period:  $360^\circ$

Amplitude: 2

Period:  $360^\circ$  (c)

(b)  $y = -2 \sin \alpha$   $y = 3 \cos \alpha$

Amplitude: 3

Period:  $360^\circ$

## 1.5 Equations and /or the properties of the given graphs. [6.4.3; 6.4.4; 6.5.5.4]

(a)  $y = 4x^2 - 64$ :





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- (1)  $(0 ; -64)$
- (2)  $(\pm 4 ; 0)$
- (3)  $x = 0$
- (4)  $x \in \mathbb{R}$
- (5)  $y \in [-64 ; \infty)$

(b)  $y = -x^2 + 4:$

- (1)  $(0 ; 4)$
- (2)  $(\pm 2 ; 0)$
- (3)  $x = 0$
- (4)  $x \in \mathbb{R}$
- (5)  $y \in (\infty ; 4]$

(c)  $(-2;0)$  and  $(1;-6)$

$$y = ax^2 + q$$

$$0 = a(-2)^2 + q$$

$$0 = 4a + q$$

$$q = -4a$$

$$y = ax^2 + q$$

$$-6 = a(1)^2 + q$$

$$-6 = a + q$$

$$-6 = a - 4a$$

$$-6 = -3a$$

$$a = 2$$

$$q = -4(2) = -8$$

$$\therefore y = 2x^2 - 8$$

(d)  $(3;0)$  and  $(4;-21)$

$$y = ax^2 + q$$

$$0 = a(3)^2 + q$$

$$0 = 9a + q$$

$$q = -9a$$

$$y = ax^2 + q$$

$$-21 = a(4)^2 + q$$

$$-21 = 16a + q$$

$$-21 = 16a - 9a$$

$$-21 = 7a$$

$$a = -3$$

$$q = -9(-3) = 27$$

$$\therefore y = -3x^2 + 27$$



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(e) (-5;-12)

$$y = \frac{a}{x}$$

$$-12 = \frac{a}{-5}$$

$$60 = a$$

$$y = \frac{60}{x}$$

