Year 10
Answers

Mathematics

Term 1
Units 1 – 10

Mathematics

LESSON ANSWERS

TERM 1

UNIT 1 - 10

YEAR 10

UNIT 1

Q1
a) 0.52% p.a.
b) 2.55% p.a.
c) daily
d) monthly
e) 0.007%

Q2
a) 4 months
b) 12 months
c) 6.90% p.a.
d) $20000

Q3
a) 5 transactions
b) i) 4% ii) 2.75% iii) 4.5%
c) $5000

Q4
a) 0.75%
b) 0.0247%

Q5
a) $2025
b) $69600
c) $180
d) $1875
e) $32.25
f) $66.37

Q6
a) $287.50
b) $5396
c) $21.34
d) $10312.50
e) $41.56
f) $28.77

Q7 $2240

Q8 $17325

Q9 $738

Q10 $84

Q11 $2974.46

Q12
a) $0.69
b) $8.28
c) $20.71

Q13 $29300

Q14 3% raise each year for 4 years because it is basically an increase of 12% as opposed to 10.5%.

Q15 $61538.46

Q16 10.8%

Q17 3.9 years

Q18 $4225 \times 7.2\% \times (3+\frac{7}{12}+\frac{25}{365})=\$1110.89$

Q19
a) A = $3370.80
I = $370.80
b) A = $2042.5
I = $142.5
c) A = $4630.50
I = $630.50
d) A = $19232.80
I = $6732.80

Q20 $13481.82

Q21 compound interest by $120.50

Q22 $I = 3000(1+0.0801)^4 - 3000 = \$1082.98$

Q23
a) 14.87%
b) 14.11%
c) 14.35%
d) 13.90%

UNIT 2

Q1
- a) $11499.28
- b) $11077.09
- c) $26381.32
- d) $29442.16

Q2
- a) $90104.49
- b) $80432.58

Q3
- a) $10737.89
- b) $3264.39
- c) $1210.24
- d) $166.35

Q4 $4895.56

Q5 $38012.09

Q7
- a) $821.40
- b) 9 years

Q8 22.99%

Q9
- a) $20,000
- b) $196,000
- c) $19,600
- d) $191,600

Q10 $7906.88

Q11 5

Q12
- a) $24500
- b) $23960
- c) $3960
- d) $4000
- e) $40

Q13 Total interest paid = $4800
equivalent simple interest rate = 3.2% p.a.

Q14
- a) 0.5% or 6% pa.
- b) 0.416% or 5% pa.
- c) 1.0% or 12% pa.
- d) 1.67% or 20% pa.
- e) 1.3% or 16% pa.
- f) 0.3% or 4% pa.

Q15
- a) 2.10%
- b) 2.65%
- c) 4.56%
- d) 13.19%
- e) 11.70%
- f) 4.30%

Q16
- a) $1200
- b) $4755.30
- c) $1082.50
- d) $177336

Q17
- a) 8.21%
- b) $98520
- c) $661

Q18
- a) 14.52%
- b) 9.36%

Q19
- a) $9341.40
- b) $2341.40
- c) $468.28
- d) 6.69%
- e) 12% p.a.

UNIT 3

Q1

a) function - domain {7 , 8 , 9}
- range {3 , 4 , 6}

b) function - domain {7 , 8 , 9}
- range {3}

c) not a function - domain {7 , 8}
- range {3 , 4 , 6}

d) correspondence that is not a relation

e) function - domain {-3 , 0 , 1 , 9}
- range $\{\pi\}$

f) not a function - domain $\{\pi\}$
- range {-3 , 0 , 1 , 9}

g) correspondence that is not a relation

h) function - domain {-3 , 0 , 1 , 9}
- range {3 , 0 , -1 , -9}

i) not a function - domain {7}
- range {11 , 2 , -4}

j) function - domain {5 , -5 , 0 , 1}
- range {8 , -3}

k) function - domain $\{1 , 2 , 3 , \pi\}$
- range {4}

l) function- domain $\{\pi , 1 , 2 , 9\}$
- range $\{1 , \pi , 9 , 2\}$

Q2

a) not a function – domain {0 , 1 , 2 , 3 , 4}
- range {4 , 3 , 2, 1 , 0 , -1 , -2 , -3 , -4}

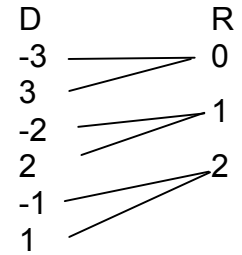
b) not a function – domain {2}
- range {3 , 2 , 1 , 0 , -1 , -2 , -3}

c) function – domain {-3 , -2 , -1 , 0 , 1 , 2 , 3}
- range {2}

d) function – domain {-3 , -2 , -1 , 1 , 3 }
- range {1 , -1 , 3 , -2 , 2}

Q3

a)

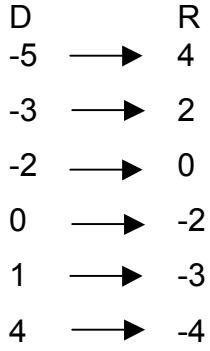


b) (-3 , 0), (-2 , 1), (-1, 2), (1 , 2), (2 , 1), (3 , 0)

c)

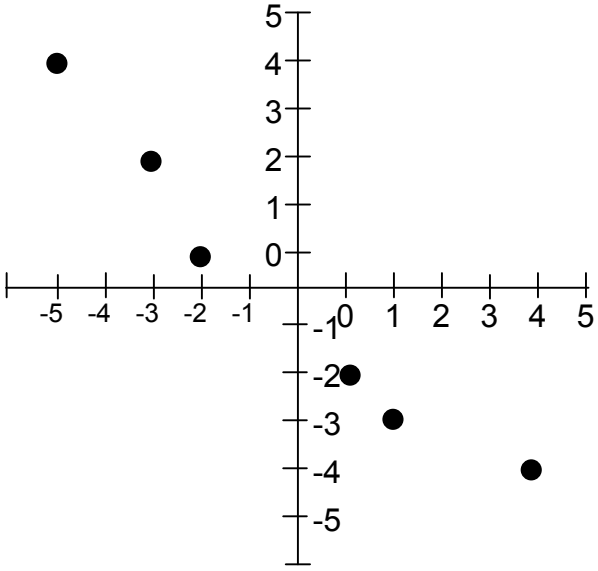
x	y
-3	0
-2	1
-1	2
1	2
2	1
3	0

Q4



a) (-5 , 4), (-3 , 2), (-2 , 0), (0 , -2), (1 , -3), (4 , -4)

b)



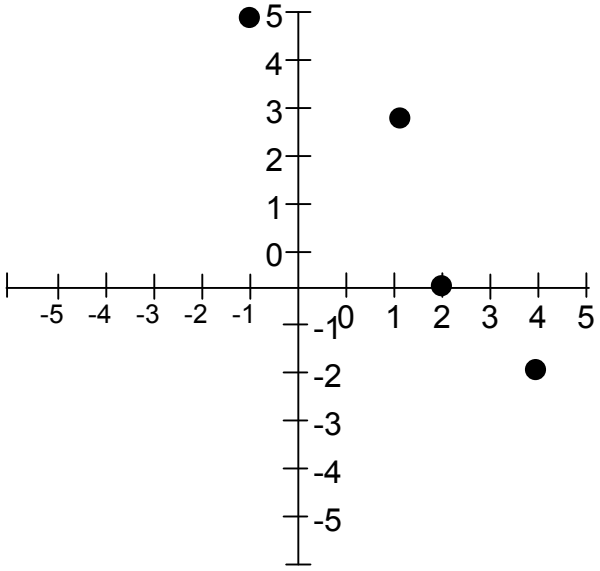
Q5

a)

x	y
-1	5
1	3
2	-1
4	-2

b) (-1 , 5) , (1 , 3) , (2 , -1) , (4 , -2)

c)



Q6
a) function
b) function
c) not a function
d) function

Q7

a) domain: {-4}
range: $(-\infty , +\infty)$
b) domain: $(-\infty , +\infty)$
range: $[-2 , +\infty]$
c) domain: [-4 , 3]
range: [-2 , 3]
d) domain: [-2 , 2]
range: [-2 , 2]
e) domain: $[-2 , +\infty]$
range: $[-\infty , 2\}$

UNIT 4

Q1

a) $\{x \mid x \neq 0\}$
b) $\{x \mid x \neq -1\}$
c) all real numbers
d) all real numbers
e) $\{x \mid x \geq 4\}$
f) $\{x \mid x \geq -\frac{3}{2}\}$
g) $\{x \mid x \geq 0\}$
h) $\{x \mid x \neq \frac{2}{3}\}$

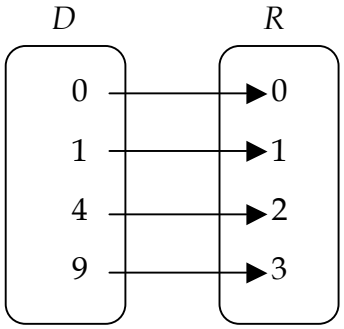
Q2 {-4 , 4} , {-2 , 2} , {0 , 0} , {1 , 1} , {3 , 3}
$\{y \mid y \geq 0\}$

Q3

x	-3	-2	-1	0	2
y	4	-1	-4	-5	-1

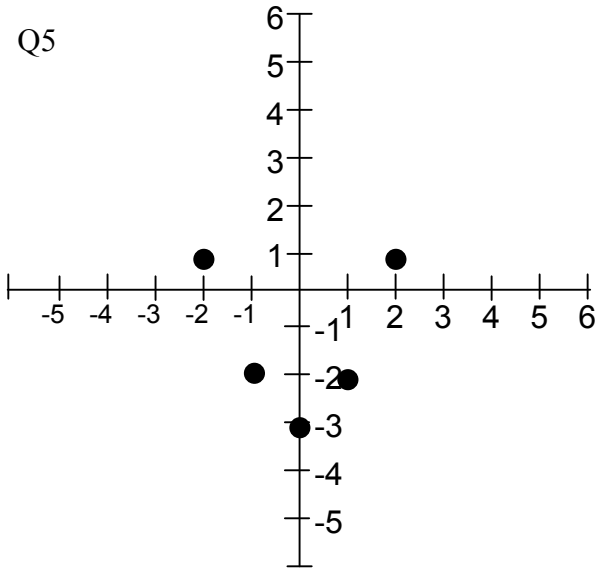
$\{y \mid y \geq -5\}$

Q4



$\{y \mid y \geq 0\}$

Q5



domain = all real numbers, range: $(y \mid y \geq -3)$

Q6

a) -3
b) -7
c) 11
d) 15
e) 3
f) 1
g) $-2\frac{1}{2}$
h) $\frac{5}{2}$

Q7

a) $3x-7$
b) $-6x-4$
c) $6x-1$
d) $x=\frac{14}{3}$

Q8

a) $\sqrt{9x+4}$
b) $2\sqrt{3x+1}+3$
c) $\sqrt{3x+3h+1}$
d) $3x+2$

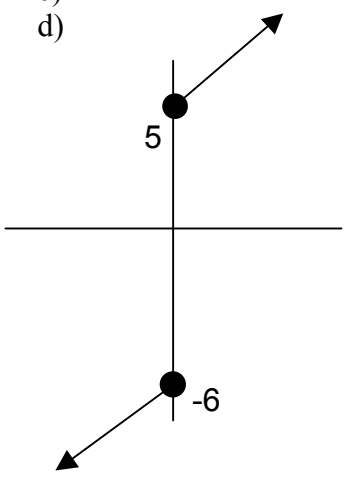
Q9 $x=$ -5

Q10

a) $2x+5$
b) $-2x+h-3$

Q11

a) -11
b) 5
c) 21
d)



Q12

a) 13
b) 13
c) 104
d) 2
e) $-\frac{2}{3}$
f) $-\frac{2}{5}$

Q13

a) 0
b) $\sqrt{6}$
c) $\sqrt{\frac{1}{x}+1}$
d) $\frac{1}{\sqrt{x+1}}$

Q14

$f\circ[g(x)], g(x)=\frac{1}{3}x,$

$f(\frac{1}{3}x)=3(\frac{1}{3}x)=x$

$g\circ[f(x)], f(x)=3x$

$g(3x)=\frac{1}{3}(3x)=x$

Q15

a) $(f\circ g)(x)=x^2-6x+9$
$(g\circ f)(x)=x^2-3$
b) $(f\circ g)(x)=-x^3-2$
$(g\circ f)(x)=-(x-2)^3=$
$-x^3+6x^2-12x+8$

Q16 $x=4$, -2

Q17

a) i) $f\circ f=4x+3$
ii) $f\circ f\circ f=8x+7$
iii) $f\circ f\circ f\circ f=16x+15$
b) i) $(2x+1)^5$
ii) $2^n x+2^n-1$

UNIT 5

Q 1

a) (4 , -1) , (5 , 0) , (6 , 1) , (7 , 2)
b) (-2 , 4) , (2 , 4) , (-3 , 9) , (3 , 9)
c) (3 , 1) , (4 , 2) , (3 , -2) , (-4 , 2)
d) (4 , 8) , (4 , 7) , (4 , 6) , (4 , 5)

Q 2 a only

Q3 b and d

Q4

a) Yes

$$f^{-1}(x)=\frac{x-9}{2}$$

b) No

$$f^{-1}(x)=\pm\sqrt{\frac{x+4}{3}}$$

c) Yes

$$f^{-1}(x)=\frac{-x+10}{5}$$

d) No

$$f^{-1}(x)=\pm\sqrt{\frac{x+1}{2}}$$

e) yes

$$f^{-1}(x)=\frac{-3}{x-1}$$

f) Yes

$$f^{-1}(x)=x^2+2$$

Q5

a) yes
b) no
c) yes
d) yes

Q6

a) yes

$y=\frac{x-10}{3}$ D: all real numbers
R: all real numbers

b) No

$f^{-1}: x=2y^2-3$

$: y=\pm\sqrt{\frac{x+3}{2}}$

c) yes

$f^{-1}: x=\frac{1}{y+1}$ D: $(x \mid x\neq 0)$
R: $(y \mid y\neq -1)$

$y=\frac{1}{x}-1$

d) yes

$f^{-1}: x=\frac{y+1}{y}$ D: $(x \mid x\neq 1)$
R: $(y \mid y\neq 0)$

$y=\frac{1}{x-1}$

e) No

$f^{-1}(x)=(y+1)^2$

$y=\sqrt{x}-1$

f) yes $y=4-x^2$

R: $(y \mid y\leq 4)$

$f^{-1}(x)=\sqrt{4-y}$

$y=4-x^2, where\ x\geq 0, hence,$ D=$\{x \mid x\geq 0\}$

Q7

a) $f^{-1}(x)=\frac{x+4}{5}$
b) $y=x$
c) $y=x$

Q8

a) $f^{-1}(x)=\frac{x+1}{x-1}$
b) x
c) x

Q9

a) $f^{-1}: x=\frac{1}{3y+5}, \quad : 3xy+5x=1$

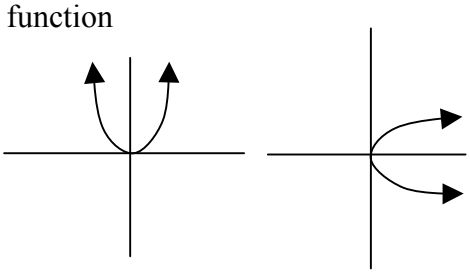
$: y=\frac{1-5x}{3x}, f^{-1}(x)\neq f(x)$

$x = \dfrac{3y-2}{5y-3}, 5xy - 3x = 3y - 2,$

b) $5xy - 3y = 3x - 2,\ y(5x-3) = 3x - 2$

$y = \dfrac{3x-2}{5x-3}, f^{-1}(x) = f(x)$

Q10 $f^{-1}(x) = \pm\sqrt{x}$ No, the inverse is not a function



Q11

a) $x \geq -1$
$x \leq -1$

b) $x \geq 0$
$x \leq 0$

Q12 $k = -1$

Q13

$f^{-1}(x) = \dfrac{x-2}{2} \qquad g^{-1}(x) = x - 3$

$(f \circ g)^{-1}(x)$
$= \{f[g(x)]\}^{-1}$
$= (2x+8)^{-1}$
$y = \dfrac{x-8}{2}$

$(g^{-1} \circ f^{-1})(x)$
$= g^{-1}[f^{-1}(x)]$
$= \dfrac{x-2}{2} - 3$
$y = \dfrac{x-8}{2}$

$\therefore (f \circ g)^{-1} = g^{-1} \circ f^{-1}$

UNIT 6

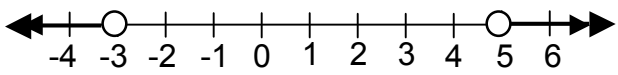
Q1 1e, 2c, 3f, 4a, 5b, 6d

Q2

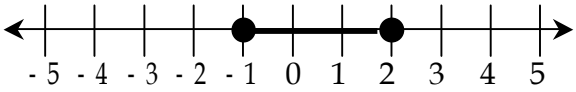
a) true
b) true
c) false
d) false

Q3

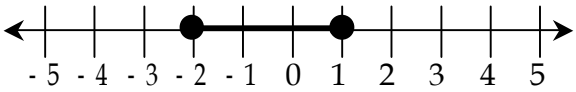
a) $x < -3, x > 5$



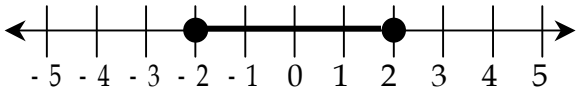
b) $-1 \leq x \leq 2$



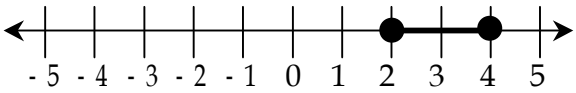
c) $-2 < x < 1$



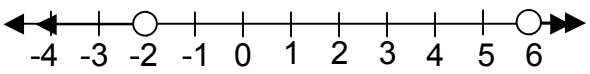
d) $-2 \leq x \leq 2$



e) $2 \leq x \leq 4$



f) $x < -2, x > 6$



g) No solution

h) All real numbers

Q4
a) $x > 1, -1 < x < 0$
b) $x < -2, 1 < x < 4$
c) $x \le -3, -2 \le x \le 1$
d) $x \ge 3, -1 \le x \le 2$
e) $x \ge 1+\sqrt{5}, x \le 1-\sqrt{5}$
f) $-1 \le x \le 7$

Q5
a) $x < -1, x > 3$
b) $-5 < x < 2$
c) $x < \frac{3}{2}, x > 4$
d) $-7 < x \le -2, x > 2$

Q6 b)

Q7 a)

Q8 c)

Q9 a)

Q10 c)

UNIT 7

Q1
a) y axis
b) x=0
c) (0 , 0)
d) 0

Q2
a) narrower
b) wider

Q3
a) upward
b) downward

Q4
a) D
b) C
c) A
d) B

Q5
a) right
b) left
c) (h ,0)
d) x = h

Q6
a) up
b) down
c) (h , k)
d) x = h
e) Minimum, Maximum

Q7
a) E
b) C
c) B
d) A
e) D

Q8
a) downward
vertex (0 , 0)
axis (x = 0)
b) upward
vertex (0 , 5)
axis (x = 0)
c) upward
vertex (-1 , 4)
axis (x = -1)
d) downward
vertex (1 , 0)
axis (x = 1)
e) downward
vertex (2 , -3)
axis (x = 2)
f) upward
vertex (4 , -1)
axis (x = 4)

Q9
a) $y = x^2 + 3$
b) $y = x^2 - 3$
c) $y = (x-3)^2$
d) $y = (x+3)^2$
e) $y = -x^2 + 5$
f) $y = -x^2 - 3$
g) $y = (x+4)^2 + 1$
h) $y = -(x+3)^2 - 5$

Q10

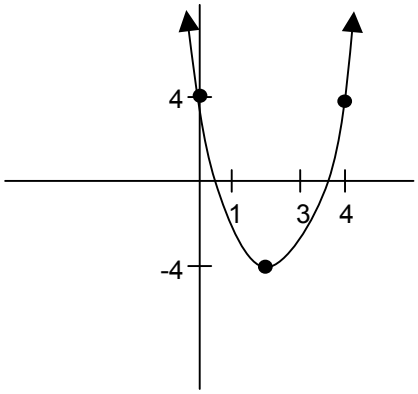
a) E
b) D
c) A
d) B
e) C
f) F

Q11

a) $y=(x+3)^2$
b) $y=-x^2+4$
c) $y=(x+2)^2-1$
d) $y=-(x-3)^2+3$
e) $y=(x-2)^2+1$
f) $y=(x-2)^2-3$

Q12

vertex = (2 , -4)
axis : $x=2$
equation : $y=2(x-2)^2-4$
minimum value = -4



UNIT 8

Q1

a) $y=(x-2)^2+3$
vertex : (2 , 3)
axis : $x=2$

b) $y=(x+4)^2-31$
vertex : (-4 , -31)
axis : $x=-4$

c) $y=-(x-3)^2+24$
vertex : (3 , 24)
axis : $x=3$

d) $y=2(x-4)^2-9$
vertex : (4 , -9)
axis : $x=-4$

Q2

a) $(-\frac{b}{2a},\frac{4ac-b^2}{4a})$
b) $x=-\frac{b}{2a}$
c) upward
d) downward
e) $\frac{4ac-b^2}{4a}$

Q3

a) y int = -6
x int = -1, 3
axis: $x=1$
vertex = (1 , -8)

b) y int = 0
x int = 0, 4
axis: $x=2$
vertex = (2 , -4)

c) y int = 3
x int = -3, 1
axis: $x=-1$
vertex = (-1 , 4)

Q4

a) (0, 9)
b) (0, -15)
c) (0, -16)

Q5

a) (6, 0), (7, 0)
b) (-8, 0), (3, 0)
c) $(\frac{3}{2}, 0), (-\frac{8}{3}, 0)$

Q6

a) axis: $x = -2$ vertex: (-2 , 6)
b) axis: $x = 1$ vertex: (1 , -25)
c) axis: $x = \frac{1}{2}$ vertex: $(\frac{1}{2}, -18\frac{3}{4})$

Q7 -23

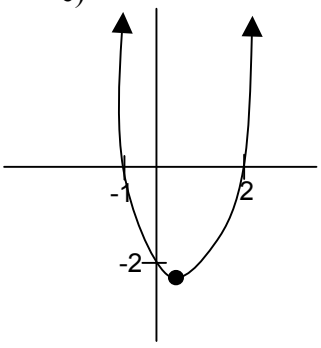
Q8 $2\frac{1}{8}$

Q9

a) D
b) F
c) E
d) B
e) A
f) C

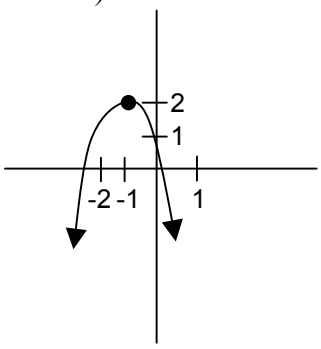
Q10

a) (0, -2)
b) (2, 0), (-1, 0)
c) $x = \frac{1}{2}$
d) $(\frac{1}{2}, -2\frac{1}{2})$
e)



Q11

a) 1
b) $1-\sqrt{2}, 1+\sqrt{2}$
c) $x = -1$
d) (-1 , 2)
e)



Q12

a) $y = 2(x-4)^2 + 1$
b) $y = -(x+5)^2 + 9$
c) $y = -(x-3)^2 - 4$
d) $y = (x-1)^2 - 4$

Q13 $y = (x-4)^2 - 1$

Q14 36 m^2

Q15 250 m $\times$ 500 m

Q16 $28\ \frac{1}{8}$ cm^2

Q17 \$15

UNIT 9

Q1

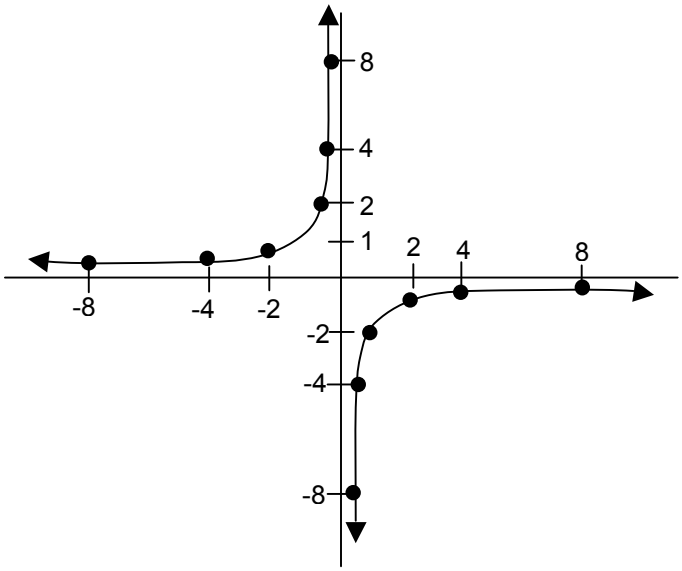
a) C
b) F
c) D
d) B
e) E
f) A

Q2

x	-4	-2	-1	-0.5	-0.25
y	0.5	1	2	4	8

x	0	0.25	0.5	1	2	4
y	∞	-8	-4	-2	-1	-0.5

Places the graph in the other 2 quadrants



Q3

a) yes
b) -16
c) 28
d) no

Q4

a) $y = \frac{-12}{x}$

b) $y = \frac{4}{x}$

Q5 domain: all real values range: $(y|\ y>0)$

Q6
a)

x	-2	-1.5	-1	-0.5
y	$\frac{1}{9}(0.11)$	$\frac{1}{3\sqrt{3}}(0.19)$	$\frac{1}{3}(0.33)$	$\frac{1}{\sqrt{3}}(0.58)$

x	0	0.5	1	1.5	2
y	1	$\sqrt{3}(1.73)$	3	$3\sqrt{3}(5.20)$	9

b)

x	-2	-1.5	-1	-0.5
y	9	$3\sqrt{3}(5.20)$	3	$\sqrt{3}(1.73)$

x	0	0.5	1	1.5	2
y	1	$\frac{1}{\sqrt{3}}(0.58)$	$\frac{1}{3}(0.33)$	$\frac{1}{3\sqrt{3}}(0.19)$	$\frac{1}{9}$

Q7

a) C
b) B
c) A
d) D

Q8

a) $x^2 + y^2 = 4$
b) $x^2 + y^2 = 9$
c) $x^2 + y^2 = 16$

Q9

a) $x^2 + y^2 = 64$
b) $x^2 + y^2 = 144$
c) $x^2 + y^2 = 289$
d) $x^2 + y^2 = 10$
e) $x^2 + y^2 = 45$
f) $x^2 + y^2 = 13\frac{4}{9}$

Q10

a) 11
b) 2.5
c) $2\sqrt{3}$
d) $\frac{3}{2}$
e) $\frac{8}{3}$

f) $\frac{3}{2}$

Q11

a) $x^2 + y^2 = 25$

b) $x^2 + y^2 = 169$

c) $x^2 + y^2 = 9$

Q12

a) centre: (0 , 4) radius: 4

b) centre: (-5 , -2) radius: $3\sqrt{2}$

c) centre: (-3 , 6) radius: 7

d) centre: (0 , -5) radius: 10

e) centre: (3 , -6) radius: 8

f) centre: (-5 , 3) radius: 6

Q13 $(x+5)^2 + (y-2)^2 = 4$

Q14 $(x-7)^2 + (y-5)^2 = 25$

Q15 $(x+1)^2 + (y-3)^2 = 5$

Q16 $(x-1)^2 + (y-1)^2 = 1$

UNIT 10

Q1 b.

Q2 \$7920

Q3

a) \$1800

b) \$120

c) \$720

d) \$450

Q4

a) \$6039.75

b) \$6246.02

c) \$7593.95

d) \$5630.81

Q5 c.

Q6 d.

Q7 a.

Q8 a.

Q9 c.

Q10 c.

Q11

a) \$95

b) \$855

c) \$256.50

d) \$46.31

Q12 \$1054.69

Q13 1238

Q14 $14\frac{2}{7}$ years

Q15

a) yes

b) domain: {2, 3, 4, 5} range: {5, 10, 17, 26}

c) {(5 , 2) , (10 , 3) , (17 , 4) , (26 , 5)}

d) yes

Q16 a is a function.
b is not a function.

Q17 (-8 , -2) , (-1 , 1) , (0 , 0) , (1 , 1) , (8 , 2)
range: {-2 , -1 , 0 , 1 , 2}

Q18

a) domain: {-3,-2,-1,0,1,2,3).
range: {-2,-1,0,1,2}

b) domain: all real value of x
range: y =2)

c) domain: $-3 \le x \le 3$
range: $-1 \le y \le 1$

d) domain: all real value of x
range: all real value of y

Q19

a) domain: $(x \mid x \ge -\frac{5}{3})$
range: $(y \mid y \ge 0)$
$f^{-1} = \frac{x^2 - 5}{3}$

b) domain: $(x \mid x \neq \frac{1}{3})$

range: $(y \mid y \neq 0)$

$f^{-1}(x) = \frac{2+x}{3x}$

Q20

a) relation
b) function
c) vertical line test
d) domain
e) range

Q21

a) -4
b) -4
c) $-\frac{5}{3}$
d) -5

Q22 10

Q23

a) $f^{-1}(x) = \frac{5}{2-x}$
b) x
c) x

Q24

a) -1<x<2

b) x<-3 or -1<x<2

c) $x \leq -3 \text{ or } x \geq 3$

d) $x \leq \frac{5-\sqrt{21}}{2} \text{ or } x \geq \frac{5+\sqrt{21}}{2}$

e) $-\frac{2}{3} \leq x < 3$

f) $2 < x < \frac{5}{2}$

Q25 D= $\{x \mid x \geq 4 , x \leq -6\}$

Q26 b.

Q27 b.

Q28 d.

Q29 vertex $(\frac{3}{2}, -\frac{3}{2})$

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

Q30

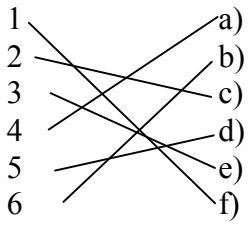
a) vertex (0 , -3)
b) vertex (-1 , -6)

Q31 c.

Q32 b.

Q33 c.

Q34



Q35 19

Q36 -33

Mathematics

HOMEWORK ANSWERS

TERM 1

UNIT 1 - 9

YEAR 10

UNIT 1

(1)

a) Advantages – flexible (can withdraw money whenever required), higher than normal interest rate, money relative safe compared to other options (unlikely to lose money)
Disadvantages – more difficult to use money than other options (most savings accounts do not allow the use of cheques or debit cards for the money in that account), interest rate isn't as high as other options

b) Savings account – bank account which in which money earns higher than average interest rate. Money can be withdrawn at any time, however some facilities such as cheques and debit cards cannot be used
Term Deposit – money in a special account that earns a much higher interest rate than normal, but which cannot be withdrawn for until the term expires. Usually the interest rate increases with the amount of money deposited and the time it is deposited for.

c) Advantages – high interest rate, relatively safe compared to other high yield investment options (unlikely to lose money), interest rate can be increased by investing more for a longer period of time.
Disadvantages – cannot use or withdraw money until term expires without incurring a penalty (for instance, loss of interest earned on the account).

d) Advantages – high interest rate, in many cases no account keeping fees
Disadvantages – required to deposit a certain amount of money every month, in many 0.cases cannot withdraw (although can often transfer to another account and withdraw from there)

(2)

a) 0.3077%
b) 0.0438%

(3)

a) $2240
b) $360
c) $810
d) $127.92

(4)

a) $624.75
b) $47.25
c) $46.82
d) $147.45

(5)

a) $2565
b) $8265

(6) $336507.50

(7) $915

(8) $2052

(9) $72075

(10) $42105

(11) 9.8%

(12) $3513.88

(13)

a) Amount Received - $3146.08
Interest Earned - $346.08
b) Amount Received - $12201.33
Interest Earned - $1901.33
c) Amount Received - $19859.27
Interest Earned - $5859.27
d) Amount Received - $1710.45
Interest Earned - $110.45

(14)

a) $3.18
b) $9.90

(15) $3631441.97

(16) $43259.24

(17) $1326.12

UNIT 2

(1)
a) $28723.68 (2 dpl)
b) $50673.61 (2 dpl)
c) $87725.68 (2 dpl)
d) $111008.15 (2 dpl)

(2)
a) $6929.20
b) $6455.79

(3)
a) $12195.8
b) $7489.75 (2 dpl)
c) $4599.64 (2 dpl)
d) $2401.04 (2 dpl)

(4) $3874.30 (2 dpl)

(5) 7%

(6) 5 years

(7) 13 % (approx)

(8) 37640 people

(9)
a) 908
b) 76

(10)
a) $10000
b) $98000
c) $9800
d) $95800

(11)
a) $29400
b) $28752
c) $4752
d) $4800
e) $48

(12)
a) $349950
b) $349848.50

(13) 5

(14)
a) $354
b) $3015
c) $406
d) $6712

(15)
a) 11.70%
b) $234000
c) $1392

(16)
a) 12%
b) 16%
c) 6%
d) 5%
e) 9%
f) 7%

(17)
a) 2.65%
b) 3.18%
c) 7.22%
d) 10.10%
e) 5.80%
f) 5.04%

(18)
a) $2128.5
b) $13536
c) $3247.50
d) $95950

(19)
a) $12456
b) $2456
c) 4.912%

Unit 3

(1) c.
(2) c.
(3) b.
(4) b.
(5) d.
(6)

a) function D = {-2, -1, 1, 2}
R = {4,7}

b) not a function D = {4, 9, 16}
R = {-2,2,3,4}

c) not a function D ={ -2, 1, 2}
R ={-4, 3, 4}

d) function D= {6, 7, 8, 9}
R = {4}

(7)

a) function D = { -3, -2, -1, 0, 1, 2, 3}
R = { -3, -2, -1, 0, 1, 2, 3}

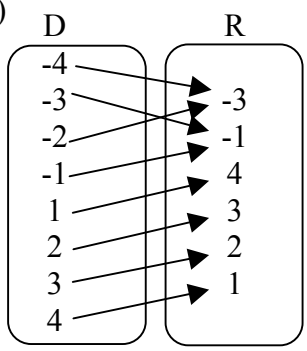
b) relation not a function
D = {-4, -3, -2, 2, 3, 4}
R = {-1, 1, 2}

c) function D= {-4, -3, -2, -1, 0, 1, 2, 3, 4}
R={0, 2, 3, 4}

d) function D = {-4, -3, -2, -1, 0, 1, 2, 3, 4}
R = {-4, -3, -2, -1, 0}

(8)

a)



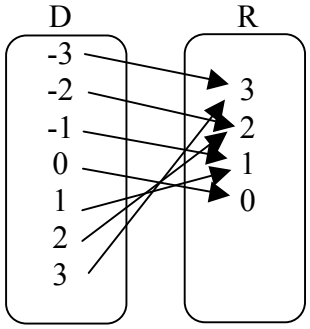
b) (-4, -3) , (-3, -1) , (-2, -3) , (-1, -1) ,
(1, 4) , (2, 3) , (3, 2) , (4, 1)

c)

x	-4	-3	-2	-1	1	2	3	4
Y	-3	-1	-3	-1	4	3	2	1

(9)

a)



b) (-3,3), (-2,2), (-1, 1), (0, 0), (1, 1), (2, 2), (3, 3)
c) teacher check
d) $y = |x|$

(10)

a)

x	-2	-1	0	1
Y	2	3	4	5

b) (-2,2), (-1,3), (0, 4), (1, 5)
c) teacher check
d) $y = x + 4$

(11)

a) no
b) yes
c) yes
d) no
e) no
f) yes

(12)

a) D : all real x
R : $y \leq 2$
b) D : all real x
R : y =3
c) D : $-2 < x < 3$
R : $-1 \leq y \leq 3$
d) D : $-3 \leq x < 2$
R : $-4 < y \leq 2$
e) D : $-2 \leq x$
R : $0 \leq y$
f) D : all real x, except $x \neq 1$
R : all real y except $y \neq 2$

UNIT 4

Q1

a) all real x, $x \neq 0$

b) all real x, $x \neq \frac{3}{2}$

c) all real x

d) all real x

e) $x \geq \frac{5}{2}$

f) all real x

g) $x \geq 0$

h) $x > 3$

Q2

a) no
b) no
c) yes
d) no
e) yes
f) yes
g) yes
h) no

Q3

(-4, 7), (-2, 3), (0, 1), (2, 5), (4, 9), (6, 13)

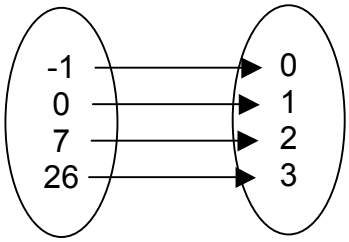
Range: {1, 3, 5, 7, 9, 13}

Q4

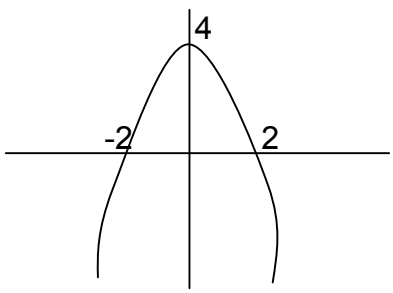
x	-3	-1	1	3	5
y	-30	-4	-2	24	122

range: {-30, -4, -2, 24, 122}

Q5



Q6 Domain: all real x Range: y ≤ 4



Q7

a) -7
b) -10
c) 33
d) 8
e) -5
f) -2
g) -5
h) $-1\frac{2}{3}$

Q8

$$f\frac{(1+h)-f(1)}{h} = \frac{3+3h+5-3-5}{h}$$
$$= 3$$

Q9

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

Q10

$$LHS = \frac{f(x+h)-f(x)}{\frac{-1}{h}}$$
$$= \frac{\sqrt{x+h}-\sqrt{x}}{\frac{-1}{h}}$$
$$= \frac{\sqrt{x}-\sqrt{x+h}}{\frac{1}{h}}$$
$$= h(\sqrt{x}-\sqrt{x+h})$$

Q11

a)

$$= 1+2-\frac{1}{2-3}$$
$$= 3+1$$
$$= 4$$

b)

$$= 4+4+\frac{1}{2}$$
$$= 8\frac{1}{2}$$

c)

$$= \frac{2(1-2)}{\frac{1}{1}}$$

$$= -2$$

d)

$$= h^2 + 2h - \frac{1}{h-2}$$

Q12 -1

Q13

a)

$f(1) = 1$	$f(4) = 4$	g(2) = 2
$f(2) = 2$	g(1) = 1	g(3) = 3
$f(3) = 3$		g(4) = 4

b) Yes, all the values are greater than 0, therefore the absolute value signs will have no effect.

Q14

a) $5 \times (2 + 3) \times (-1 + 3)$
$= 5 \times 5 \times 2$
$= 50$

b) $(0 + 3) + (-2) - (\frac{3}{2} + 3)$

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

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

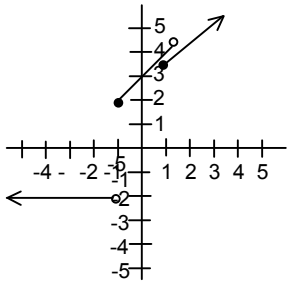
c)

$$\frac{(\frac{1}{2}+3)-(-2)}{(1+3)}$$

$$= \frac{3\frac{1}{2}+2}{4}$$

$$= \frac{11}{8}$$

d)



Q15

a) $= (-2)^2 + 3(-2) - 5$
$= 4 + 5 - 6 - 5$
$= -2$

b) $= (-6)^2 + 5 - 3(-6) + 5$
$= 36 + 5 + 18 + 5$
$= 64$

c) $(9 + 5)(9 - 5)$
$= 56$

d) $(4 + 5)(-6 - 5)$
$= 9 \times -11$
$= -99$

e) $\frac{4+5}{1} = 9$

f)

$$\frac{(9+5)}{-14}$$

$$= -1$$

Q16

$$2(x^2 + 2) = 2x^2 + 4$$

Q17

$$f(g(x))$$
$$= (\sqrt{2x-1})^4 + (\sqrt{2x-1})^2$$
$$= (2x-1)^2 + 2x - 1$$
$$= 4x^2 - 2x$$
$$Domain: all\ real\ x$$

Q18

a)

$2(2x^2+1)-1$

$=4x^2+2-1$

$=4x^2+1$

b)

$=2(2(x+1)-1)^2+1$

$=2(2x+1)^2+1$

$=2(4x^2+4x+1)+1$

$=8x^2 8x+2+1$

$=8x^2+8x+3$

Q19

a)

$f(g(x))=20x+13$

$3(g(x))-1=6x-13$

$g(x)=2x-4$

b)

$f(g(x))=20x+13$

$5(g(x))-2=20x+13$

$g(x)=4x+3$

UNIT 5

Q1

a) { (1, -1), (1, 0), (1, 1), (1, 2) }
b) { (-3, 9), (3, 9), (-4, 16), (4, 16) }
c) { (3, 1), (5, 2), (7, 3), (9, 4) }
d) { (4, 8), (3.5, 7), 3, 6), (2.5, 5) }

Q2

a) no
b) yes
c) no
d) yes
e) no
f) no

Q3

a) No b) Yes
c) No d) Yes

Q4

a)

$x=3y-13$

$3y=x+13$

$y=\frac{1}{3}x+\frac{13}{3}$

yes it is a function

b)

$x=y^2-16$

$y=\pm\sqrt{x+16}$

no

c)

$y+2x=12$

$y=12-2x$

yes

d)

$x=ay^2-4$

$y^2=\frac{x+4}{9}$

$y=\pm\sqrt{\frac{x+4}{9}}$

no

Q5

a)

$x=5-2y$

$2y=5-x$

$y=\frac{5-x}{2}$

b)

$f(1)=3$

$f^{-1}(f(1))=f(3)=\frac{5-3}{2}=1$

c)

$f(-\frac{1}{2})=6$

$f^{-1}(4)=\frac{5-6}{2}=\frac{-1}{2}$

d)

$f(4)=-3$

$f^{-1}(4)=\frac{1}{2}$

$f(\frac{1}{2})=5-1$

$=4$

e)

$f^{(-1)}(f(x))$

$=\frac{5-5+2x}{2}$

$=x$

f)

$f(f^{-1}(x))$

$=5-\frac{2(5-x)}{2}$

$=x$

Q6

a)

$x=\frac{2y+3}{y-1}$ $x=\frac{2y-2+5}{y-1}$

$=2+\frac{5}{y-1}$ $x-2=\frac{5}{y-1}$

$y-1=\frac{5}{x-2}$ $y=\frac{x+3}{x-2}$

b)

$$f\circ f^{-1}=\frac{2(\frac{x+3}{x-2})+\frac{3(x-2)}{(x-2)}}{\frac{x+3}{x-2}-\frac{x-2}{x-2}}=\frac{\frac{5x}{x-2}}{\frac{5}{x-2}}=x$$

c)

$$f^{-1}\circ f=\frac{\frac{2x+3}{x-1}+\frac{3(x-1)}{x-1}}{\frac{2x+3}{x-1}-\frac{2(x-1)}{x-1}}=\frac{\frac{5x}{x-1}}{\frac{5}{x-1}}=x$$

Q7 $g(x)5-\frac{3}{x}$, teacher check sketches on the number plane

Q8

$x=4y-1$

$4y=x+1$

$\therefore f^{1}(x)=\frac{x+1}{4}$

$f^{1}(5)=\frac{-5+1}{4}$

$=\frac{-4}{4}$

$=-1$

Q9

$x=\frac{1}{6}y+\frac{5}{6}$

$6x=y+5$

$y=6x-5$

$\therefore f(x)$ and $g(x)$ are inverse functions

Q10

a)

$=-3(x^2-2x+1)+2$

$=-3x^2+6x-3+2$

$=-3x^2+6x-1$

vertex at : $x=-\frac{b}{2a}=1$

$\therefore$ the domain could be restricted as

$x\geq 1,\ x\leq 1$

b)

$y=\sqrt{25-x^2}$

the domain could be restricted as

$5\geq x\geq 0,\ -5\leq x\leq 0$

Q11

Let $y = f(x) = \frac{ax+b}{cx-a}$, $x \in \circ \left\{\frac{a}{c}\right\}$,

$y \in \circ \left\{\frac{a}{c}\right\}$.

Then $y(cx-a) = ax+b$

$ycx - ya = ax + b$

$-ya - b = ax - xyc$

$-ay - b = x(a - cy)$

$x = \frac{-ay-b}{a-cy}$

$y = f^{-1}(x) = \frac{-ax-b}{a-cx}$

$y = f^{-1}(x) = \frac{ax+b}{cx-a}, x \in \circ \left\{\frac{a}{c}\right\}, y \in \circ \left\{\frac{a}{c}\right\}$

Hence $f = f^{-1}$.

UNIT 6

Q1

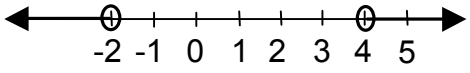
1. – b)
2. – a)
3. – e)
4. – d)
5. – c)
6. – f)

Q2

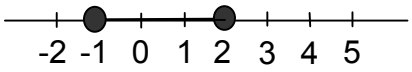
a) True
b) False
c) True
d) False

Q3

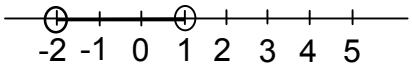
a) x < -2 or x >4



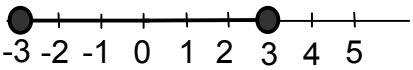
b) -1≤ x ≤ 2



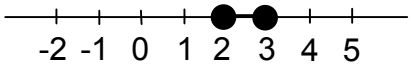
c) -2< x <1



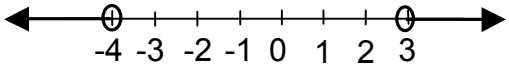
d) -3 ≤ x ≤ 3



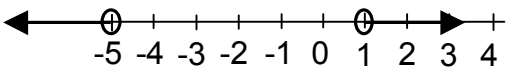
e) 2≤ x ≤ 3



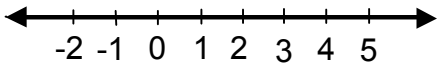
f) x < -4 or x >3



g) x < -5 or x >1

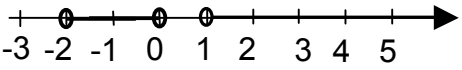


h) R ∋ x No solution

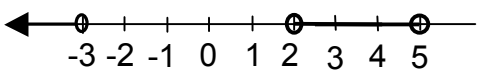


Q4

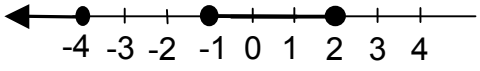
a) -2< x <0 or 1< x



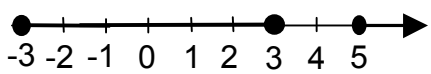
b) x < -3 or 2< x <5



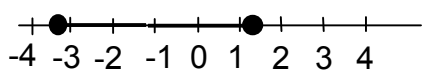
c) x ≤ -4 or -1 ≤ x ≤ 2



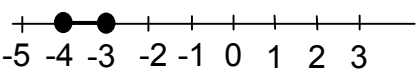
d) -3 ≤ x ≤ 3 or 5 ≤ x



e) $-1-\sqrt{5} \le x \le -1+\sqrt{5}$

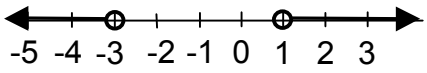


f) -4 ≤ x ≤ -3

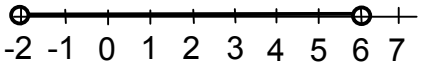


Q5

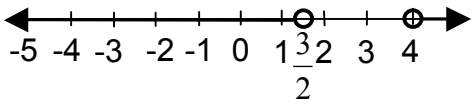
a) $x < -3$ or $x > 1$



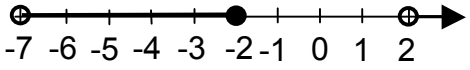
b) $-2 < x < 6$



c) $x < \frac{3}{2}$ or $4 < x$



d) $-7 < x \leq -2$ or $x > 2$



Q6 b)

Q7 c)

Q8 c)

Q9 d)

Q10

a) False
b) False
c) True
d) True

UNIT 7

Q1

a) $y-axis$
b) $-\frac{b}{2a}$
c) (0,0)
d) 0

Q2

a) $y-axis$
b) $-\frac{b}{2a}$
c) (0,0)
d) 0

Q3

a) $y-axis$
b) $-\frac{b}{2a}$
c) (0,0)
d) 0

Q4

a) wider
b) narrower
c) wider
d) narrower
e) wider
f) narrower
g) narrower
h) wider

Q5

a) upward
b) upward
c) downward
d) downward
e) upward
f) downward
g) upward
h) downward

Q6

a) A
b) C
c) B
d) D

Q7
a) 2, right
b) (2,0)
c) x=2
d) 0

Q8
a) 4
b) right
c) (4,0)
d) x=4
e) 0

Q9
a) 2, left
b) (-2, 0)
c) 2, right
d) (2, 0)
e) 3, left
f) (-3, 0)
g) 3, left
h) (-3, 0)
i) 5, left
j) (-5, 0)

Q10
a) 2, left, 1
b) (-2, -1)
c) 4, right, 1
d) (4, -1)
e) 1, left, 3
f) (-1, 3)
g) 2, left,4
h) (-2, 4)
i) 2, right, 2
j) (2, -2)

Q11
a) D
b) A
c) E
d) C
e) B

Q12
a) downward
(0, 0)
$x = 0$

b) upward
(0, 2)
$x = 0$

c) upward
(-2, 1)
x= -2

d) downward
(3, 0)
x=3

e) downward
(1, -4)
x= 1

f) upward
(1, -2)
x=1

g) upward
$(\frac{1}{2}, 1)$
$x = \frac{1}{2}$

h) downward
$(-2, \frac{1}{3})$
x= -2

i) downward
$(2, -\frac{1}{4})$
x=2

Q13
a) $y = x^2 + 2$
b) $y = x^2 - 2$
c) $y = (x-6)^2$
d) $y = (x+5)^2$
e) $y = -x^2 + 4$
f) $y = -x^2 - 2$
g) $y = (x+3)^2 + 2$
h) $y = -(x+2)^2 - 4$
i) $y = -(x+3)^2 + 1$
j) $y = -(x-3)^2 + 2$

Q14

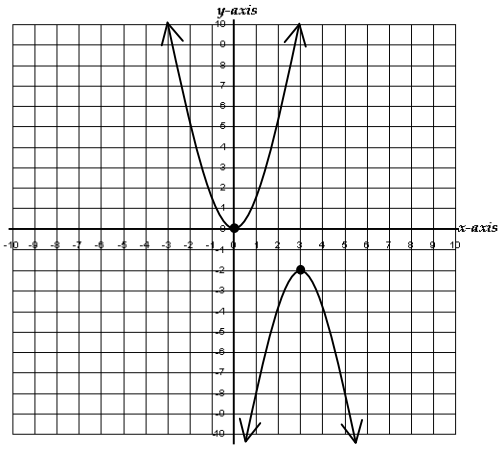
a) C
b) B
c) F
d) D
e) A
f) E

Q15

a) $y= (x+3)^2$
b) $y= -x^2+4$
c) $y= (x+2)^2-1$
d) $y= -(x-3)^2+3$
e) $y=(x-2)^2+1$
f) $y=(x-2)^2-3$

Q16

(3, -2), x= 3
Maximum y= -2



UNIT 8

Q1

a) V(1,1), x = 1

b) $V(-\frac{7}{2}, -\frac{5}{4})$, $x = -\frac{7}{2}$

c) V(3, 48), x = 3

d) V(4, -31), x = 4

e) V(1,1), x = 1

f) V(-2, 4), x = -2

Q2

a) (-1, 0)
b) x = -1
c) upward
d) 0
e) (1, 3)
f) x = 1
g) downward
h) 3
i) (-3,1)
j) x = -3
k) downward
l) 1
m) (4, 1)
n) $x = 4$
o) upward
p) 1

Q3

a) $y_{\text{int}} = -6,\ x = 1$
$x_{\text{int}} = -1,3\ \ V(1,-8)$

b) $y_{\text{int}} = 0\ \ x = 2$
$x_{\text{int}} = 0,4\ \ V(2,-4)$

c) $y_{\text{int}} = 3\ \ x = -1$
$x_{\text{int}} = -3,1\ \ V(-1,4)$

Q4
a) 9
b) -15
c) -12
d) 6
e) -1
f) -3

Q5
a) 3, 5
b) -5, 10
c) $-1, \frac{5}{2}$
d) 1, 3
e) 0, 4
f) -2, -1

Q6
a) x= -1, V(-1, 3)
b) x=$\frac{7}{2}$, V($\frac{7}{2}$, $-\frac{25}{4}$)
c) x=$-\frac{1}{2}$, V($-\frac{1}{2}$, $\frac{9}{4}$)
d) x=-1, V(-1, -1)
e) x=$-\frac{3}{2}$, V($-\frac{3}{2}$, $-\frac{5}{2}$)

Q7
a) -10
b) 2
c) 0
d) -30

Q8
e) 5
f) 0
g) 1
h) $\frac{1}{2}$

Q9
a) C
b) A
c) B
d) D
e) F
f) E

Q10
a) 5
b) none
c) $x = 2$
d) (2,1)
e)

Q11
a) 3
b) -3, 1
c) x=-1
d) (-1, 4)
e)

Q12
a) $y = 2(x-4)^2 + 1$
b) $y = -(x+5)^2 + 9$
c) $y = -(x-3)^2 - 4$
d) $y = (x-1)^2 - 4$

Q13
a) $y = x^2 - 4x + 3$
b) $y = -x^2 + 1$
c) $y = 2x^2 - 8x + 6$
d) $y = -4(x-\frac{1}{2})^2 + 9$

Q14
Length: 6 cm, width: 6 cm

Q15
Length: 500 m, width: 250 m

Q16
18 cm^2

UNIT 9

Q1

Q2

Q3

a) No
b) Yes
c) No
d) No
e) k = - 8
f) k = 2
g) k = - 4
h) k = 6
i) No

Q4

Q5

Q6

a) $C(0,0)\ r=4$
b) $C(0,0)\ r=3$
c) $C(0,0)\ r=\sqrt{6}$
d) $C(0,0)\ r=\sqrt{3}$
e) $C(1,2)\ r=5$
f) $C(3,4)\ r=5$
g) $C(1,-2)\ r=6$
h) $C(-1,-5)\ r=12$
i) $C(-2,2)\ r=\sqrt{3}$

Q7

a) $x^2+y^2=4$
b) $x^2+y^2=9$
c) $x^2+y^2=3$
d) $x^2+y^2=10$
e) $x^2+y^2=27$
f) $x^2+y^2=\frac{1}{4}$

Q8

a) $(x-1)^2+(y-2)^2=1$
b) $(x+1)^2+(y-2)^2=4$
c) $(x+1)^2+(y+1)^2=9$
d) $(x+2)^2+(y-1)^2=25$
e) $(x+8)^2+(y-1)^2=2$
f) $\left(x+\sqrt{2}\right)^2+(y-1)^2=3$

Q9

a) $x^2+y^2=25$
b) $(x-1)^2+y^2=1$
c) $x^2+(y+2)^2=20$
d) $(x-2)^2+(y-2)^2=10$
e) $\left(x-\sqrt{2}\right)^2+(y+1)^2=4-2\sqrt{2}$
f) $(x-3)^2+\left(y-2\sqrt{5}\right)^2=46$

Q10

a) $C(-3,6)\ r=7$
b) $C(0,-5)\ r=10$
c) $C(3,-6)\ r=8$
d) $C(-5,3)\ r=6$
e) $C(-1,1)\ r=4$
f) $C\left(\sqrt{2},0\right)\ r=2$

Q11

$\left(x-\sqrt{2}\right)^2+\left(y-\sqrt{2}\right)^2=2$

Q12

$\left(x-\sqrt{3}\right)^2+\left(y+\sqrt{3}\right)^2=3$

Q13

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

Q14

$(x+2)^2+(y+1)^2=12$