

**Chapter 1**

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1. Create and solve a linear system of equations that models the following problems. Show a proper solution including *let statements and closing sentences*.
  - a) Bart's cell phone package costs \$15 a month with an additional charge of \$0.10 per minute. Lisa's pays \$10 a month plus \$0.12 per minute. When would their monthly bills be the same?
  - b) Frasier invested \$1200 in an RRSP. He invested part of the money in a technology fund that pays interest at 15% per year. He puts the remainder in savings bonds that pay 5% interest per year. If he earned \$160 in interest in one year, how much did he invest in each fund?
2. Solve the following system graphically:
$$y = -2x + 8$$
$$3x - 4y = 12$$
3. Solve the following system using elimination:
$$6x - 8y = -58$$
$$4x + 5y = 13$$
4. For the following system of equations, determine, **without solving**, the number of solutions the system has:
$$2x + y = 12$$
$$15x + 3y = 18$$
5. Evaluate  $3a^2 - b$  if  $a = -\frac{1}{2}$ ,  $b = \frac{2}{3}$ .
6. Solve each of the following:
  - a)  $y + 2(y - 1) = 4y + 7$
  - b)  $\frac{1}{4}(3x - 1) = \frac{2}{5}(x + 4)$
7. Which of the following points lie on the line  $y = \frac{2}{3}x - 4$ :
  - a)  $A(3, -2)$
  - b)  $B(-3, -2)$
  - c)  $C(6, 0)$
  - d)  $\left(5, \frac{2}{3}\right)$

**Chapter 2**

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1. A straight path is to be built between the points  $A(-35, 32)$  and  $B(29, -16)$  where the grid units are in metres.
  - a) How long is the path?
  - b) If a bench is to be placed at the halfway point on the path, what are the coordinates where the bench would be placed?
2. A fish catching a small insect on the surface of a still pond causes a circular ripple. The radius of the circle increases at a constant rate of 4cm/s.
  - a) Write an equation that represents the ripple exactly 5 seconds after the fish catches the insect.
  - b) How long would it take the ripple to reach the edge of a rock that is exactly 1 metre east and 0.75 metres north of the point where the fish caught the insect?

- A triangle is formed by joining the vertices  $A(1,1)$ ,  $B(4,5)$  and  $C(9,-5)$ . Using lengths and slopes, determine the type of triangle it is.
- A circle has its centre at the origin and passes through the points  $P(-1,13)$  and  $Q(11,k)$ . If point  $Q$  is in the first quadrant:
  - Determine the value of ' $k$ '.
  - Determine the equation of the perpendicular bisector of  $PQ$ . Show that it passes through the centre of the circle.
- A house is to be connected to a new water main that runs along the grid following the path of the line  $y = \frac{2}{3}x - 1$ . The connection point on the house lies on the same grid with coordinates at  $(2,9)$  where the units of the grid are in metres. What length of plastic pipe would be required to connect to the water main at the closest point.
- Determine the circumcentre of the triangle formed by the points  $T(-1,9)$ ,  $U(21,3)$  and  $S(-5,-3)$ .

### Chapter 3

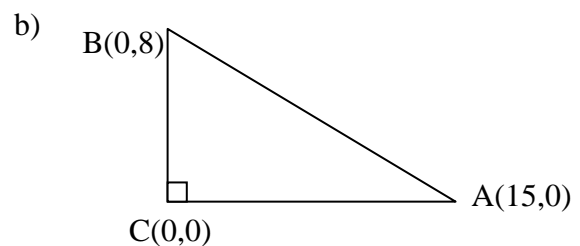
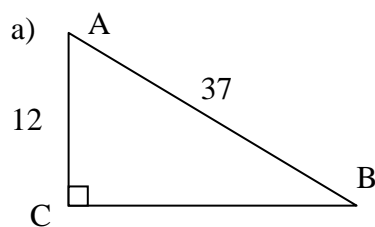
- Expand and simplify:
  - $(x+4)(x-7)$
  - $(2x-9)(3x-5)$
  - $-4(x+6)^2$
- Factor each expression:
  - $x^2 - 3x - 28$
  - $81x^2 - 25$
  - $25x^2 - 20x + 4$
  - $24x^2 + x - 10$
- Sketch the graph of each of the following. Clearly label the zeros and the vertex.
  - $y = (x-6)(x+2)$
  - $y = -(x-1)(x-9)$
- Solve each of the following:
  - $x^2 + 7x + 12 = 0$
  - $x^2 - 2x = 48$
  - $5x^2 + 4x = 2 - 5x$
- The accountants at Hitech Shoe Company have determined that the relation  $P = -2x^2 + 20x - 42$  accurately models the company's profit in a three month period.  $P$  represents the profit, in hundred thousand dollar units, and  $x$  represents the number of shoes they sell, in hundred thousand units.
  - Sketch a graph that represents this relationship.
  - Determine the range in the number of pairs of shoes they must sell to yield a profit.
  - How many pairs of shoes must they sell to maximize their profit?
  - What is this maximum profit?
  - If their profit was \$600 000, how many pairs of shoes did they sell?
- Simplify or evaluate, as required:
  - $\left(\frac{2}{5}\right)^{-2}$
  - $4^0 + 4^{-1}$
  - $(-3x^3y^4)^2$
  - $-5^2$
  - $(x^4)^2 \div x^3$
  - $\frac{a^3b^4c}{a^{-2}bc^2}$
  - $\frac{2^2 - 2^{-1}}{2}$

Chapter 4

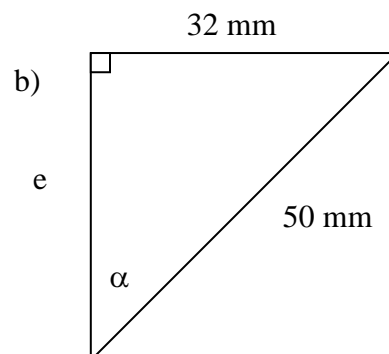
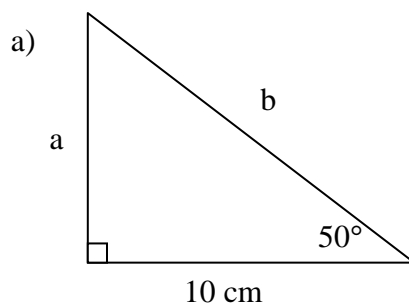
- Determine the quadratic relation, in vertex form, for each of the following:
  - has its vertex at (5,8) and passes through the point (11,-46).
  - has zeros at -3 and 7 and passes through the point (5,-8).
  - has standard equation of  $y = 2x^2 + 12x - 17$ .
- Sketch the graphs of the following. Clearly show the 5 points.
  - $y = 2(x+3)^2 - 6$
  - $y = -\frac{1}{2}x^2 + 11$
- Determine the roots of the following equations. Express your answers accurate to two decimal places, where appropriate:
  - $3(t-7)^2 - 15 = 0$
  - $2x^2 + 4x - 30 = 0$
  - $3x^2 - 2x - 11 = x^2 - 5x$
- A model rocket is launched from a 5 metre high pad straight up into the air with an initial velocity of 150 m/s. The height of the rocket  $h$ , in metres, is modelled by  $h = -5t^2 + 150t + 5$ , where  $t$  is the elapsed time in seconds.
  - What is the maximum height of the rocket?
  - For what length of time was the rocket above 730 metres?
- For each of the following, state the vertex, direction of opening, min/max value, equation of axis of symmetry and shape compared to  $y = x^2$ :
  - $y = -2(x+1)^2$
  - $y = \frac{1}{2}x^2 + 2x$
  - $y = x^2 - 6x + 9$

Chapter 5

- Determine the values of the three primary trig ratios for  $\angle BAC$  in the following:



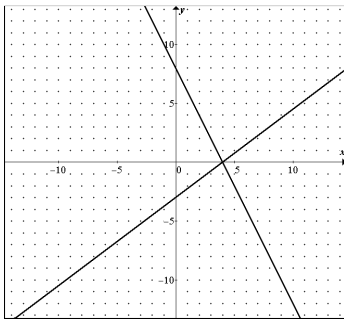
- Find the measures of the indicated sides or angles in each of the following:



**Answers – Chapter 1:**

1. a) The cell phone plans cost the same when 250 minutes of calls are placed. The cost is \$40.00.  
b) He invested \$1000 in the technology fund and \$200 in savings bonds.

2.



The point of intersection is  $(4,0)$ .

3. The solution is  $(x, y) = (-3, 5)$ .

4. Since their slopes are different, there will be one solution.

5.  $\frac{1}{12}$

6. a)  $y = -9$       b)  $x = \frac{37}{7}$

7. A and C

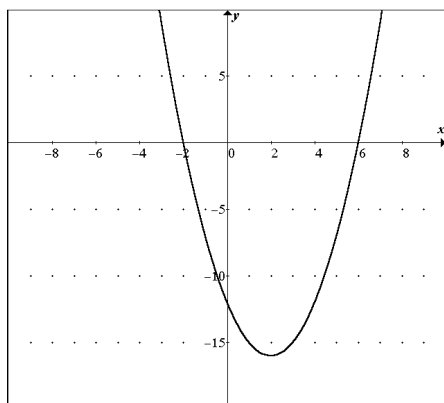
**Answers – Chapter 2:**

1. The length of the path is 80 metres and the bench should be at  $(-3, 8)$ .  
2. The equation is  $x^2 + y^2 = 400$  and it will take 31.25 seconds for the ripple to reach the rock.  
3. The triangle is a right triangle.  
4. a)  $k = 7$       b) the equation is  $y = 2x$  which passes through the origin.  
5. The pipe should be  $\sqrt{52}$  or approximately 7.2 metres long.  
6. The circumcentre is  $\left(\frac{49}{6}, -\frac{13}{18}\right)$ .

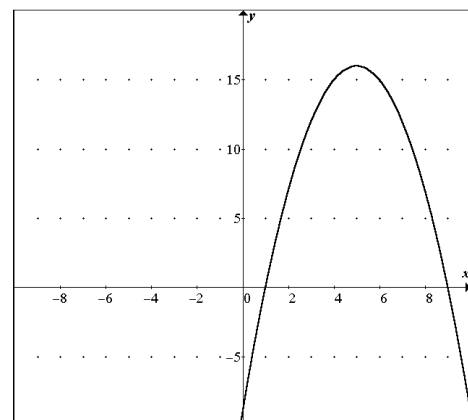
**Answers – Chapter 3:**

1. a)  $x^2 - 3x - 28$       b)  $6x^2 - 37x + 45$       c)  $-4x^2 - 48x - 144$   
2. a)  $(x - 7)(x + 4)$       b)  $(9x - 5)(9x + 5)$       c)  $(5x - 2)^2$       d)  $(3x + 2)(8x - 5)$

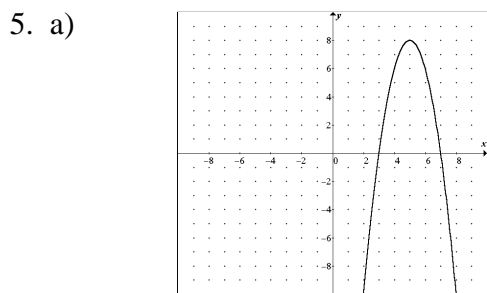
3. a)



b)



4. a)  $x = -3$  or  $x = -4$       b)  $x = 8$  or  $x = -6$       c)  $x = -2$  or  $x = \frac{1}{5}$

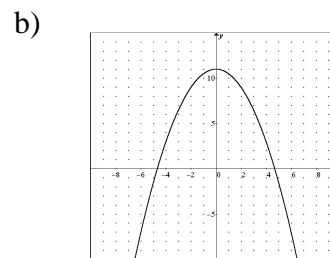
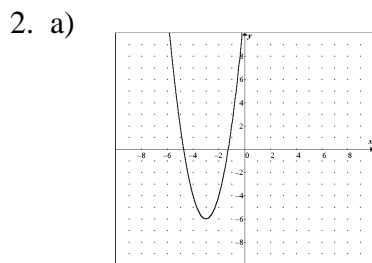


- b) they must sell between 300 000 and 700 000.  
c) the maximum profit occurs when they sell 500 000 pairs.  
d) the maximum profit is \$800 000.  
e) they sold either 400 000 or 600 000 pairs.

6. a)  $\frac{25}{4}$       b)  $\frac{5}{4}$       c)  $9x^6y^8$       d)  $-25$       e)  $x^5$       f)  $\frac{a^5b^3}{c}$       g)  $\frac{7}{4}$

**Answers – Chapter 4:**

1. a)  $y = -\frac{3}{2}(x-5)^2 + 8$       b)  $y = \frac{1}{2}(x-2)^2 - \frac{25}{2}$       c)  $y = 2(x+3)^2 - 35$



3. a)  $t \doteq 9.24$  or  $t \doteq 4.76$       b)  $x = -5$  or  $x = 3$       c)  $x \doteq 1.71$  or  $x \doteq -3.21$

4. a) the maximum height is 1130 metres.  
b) the rocket was above 730 metres for about 17.88 seconds.

5.	vertex	direction	min/max	axis of sym	shape
(a)	$(-1,0)$	down	max 0	$x = -1$	thinner
(b)	$(-2,-2)$	up	min $-2$	$x = -2$	wider
(c)	$(3,0)$	up	min 0	$x = 3$	same

**Answers – Chapter 5:**

1. a)  $\sin \angle BAC = \frac{35}{37}$        $\cos \angle BAC = \frac{12}{37}$        $\tan \angle BAC = \frac{35}{12}$

b)  $\sin \angle BAC = \frac{8}{17}$        $\cos \angle BAC = \frac{15}{17}$        $\tan \angle BAC = \frac{8}{15}$

2. a)  $a \doteq 11.92$        $b \doteq 15.56$       b)  $\alpha \doteq 39.8^\circ$        $e \doteq 38.42$