

Check off the courses you have taken.

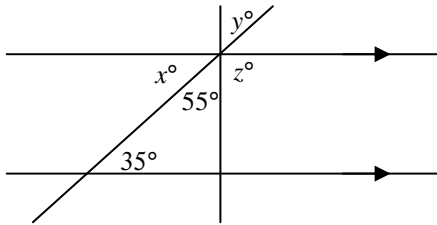
- ☐ 9 applied
- ☐ 9 academic
- ☐ 9 summer school
- ☐ 10 applied
- ☐ 10 academic
- ☐ 10 summer school

Name: _____

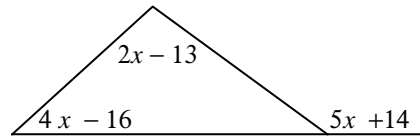
MCF 3M1
11U/C DIAGNOSTIC

GEOMETRIC RELATIONSHIPS

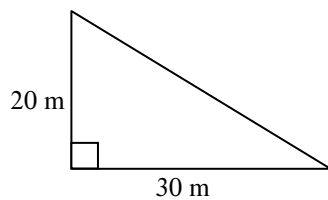
1. Find the missing angles. Justify your answer. (3 marks)



2. Find x . Show your work. (2 marks)



3. Use the diagram below to answer the following questions. Show your work. (6 marks)



- a. What length of fencing is needed to surround this triangular section of land, to the nearest metre?

- b. What is the area of the triangular section of land?

PROPORTIONAL REASONING

4. An 84 m^2 condo in a new apartment block sells for \$235 000. If the cost per square foot is the same throughout the building, what is the price of a 140 m^2 condo? Round the answer to the nearest thousand. (3 marks)
5. Patrick borrowed \$600 for 8 months. The annual interest rate is 21%. (5 marks)
- How much interest will Patrick owe at the end of 8 months?
 - How much will he have to pay back at the end of 8 months?

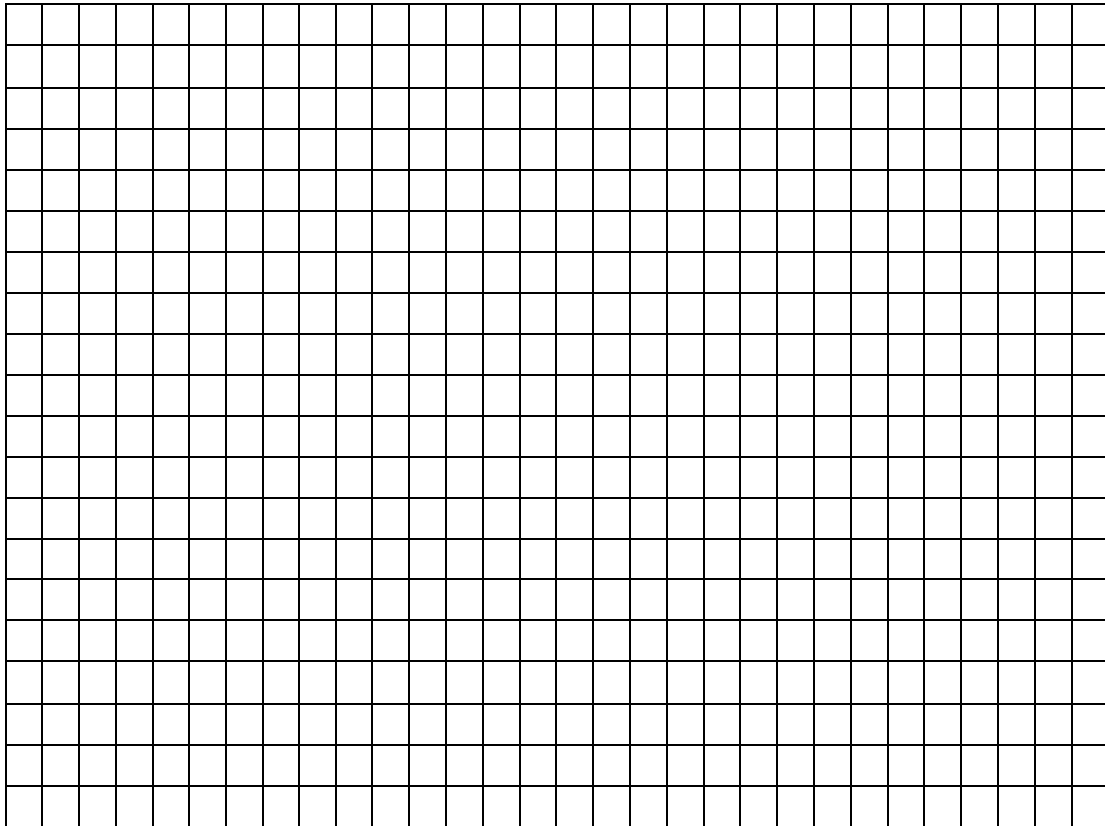
RELATIONS

6. Use the data in the table below to answer the following questions. (6 marks)

x	y	1 st Differences	2 nd Differences
-3	31		
-2	18		
-1	9		
0	4		
1	3		
2	6		

- State whether the relation is linear, quadratic or neither. Explain your reasoning.

b. Graph the data. Draw line/curve of best fit.



7. For the graph state and label each of the following. (8 marks)

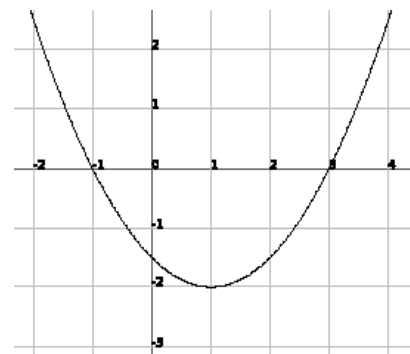
a. the coordinates of the vertex

b. the equation of the axis of symmetry

c. the x - and y -intercepts

d. the maximum/minimum value

e. the equation of the parabola



LINEAR RELATIONS

8. Karen wants to rent a moving truck for 1 day. She is comparing prices from two rental companies:
Company A charges \$40 plus \$0.49 per km
Company B charges \$71 plus \$.018 per km

(7 marks)

- a. Write an equation to model the cost for each company. Use C to represent the cost in dollars and d to represent the distance in km.

- b. Which company should Karen choose if she is moving 50 km away? Explain your reasoning.

9. A company is having business cards printed. The cost to design the business card is \$25. There is an additional charge of \$0.02 per business card printed. (5 marks)

- a. Identify the fixed cost and the variable cost for the situation.

- b. Write an equation representing this relationship.

- c. Use your equation to determine the total cost of 500 business cards.

10. Rick invested \$15 000 in 2 investments: one that pays 8% interest and one that pays 5% interest. If he receives \$1035 in interest at the end of one year, how much did he invest at each rate of interest? (6 marks)

POLYNOMIALS

11. Solve. (4 marks)

a. $x + 9 = 3 - x$

b. $\frac{x-5}{7} = 3$

12. Simplify. (12 marks)

a. $(5x^2 + 7x - 4) - (6x^2 + 9x - 3)$

b. $3(x^2 - 2x + 7)$

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

d. $\frac{(x^6)^3 (x^3)^2}{(x^5)^2}$

e. $-4[3 - 2(x + 5) - 4x]$

f. $(x + 3)(x - 5)$

g. $2(3x + 1)(x - 4)$

13. Factor. (4 marks)

a. $18x - 27$

b. $x^2 - 36$

c. $x^2 - 3x - 28$

d. $x^2 + 10x + 25$

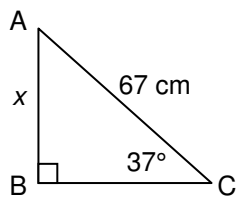
14. Evaluate. (2 marks)

a. 8^0

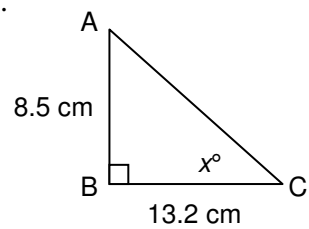
b. $\left(\frac{4}{3}\right)^{-1}$

15. Find the missing side length or angle specified. (5 marks)

a.



b.



Check off the courses you have taken.

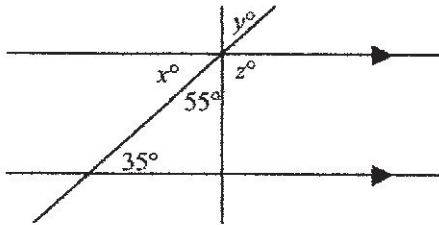
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Name: Answers

MCF 3M1
11U/C DIAGNOSTIC

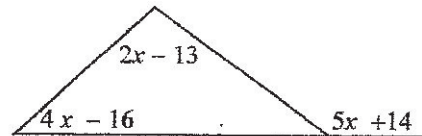
GEOMETRIC RELATIONSHIPS

1. Find the missing angles. Justify your answer. (3 marks)



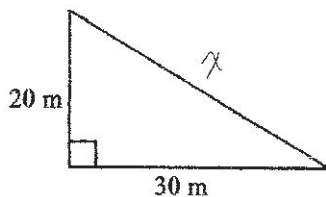
$$\begin{aligned} x^\circ &= 35^\circ \text{ (alternate } \angle\text{'s/z pattern)} \checkmark \\ y^\circ &= 55^\circ \text{ (SAT)} \checkmark \\ z^\circ &= 180^\circ - (55^\circ + 35^\circ) \\ &= 90^\circ \text{ (SAT)} \checkmark \end{aligned}$$

2. Find x . Show your work. (2 marks)



$$\begin{aligned} 2x - 13 + 4x - 16 &= 5x + 14 \checkmark \\ 6x - 29 &= 5x + 14 \\ x &= 43 \checkmark \end{aligned}$$

3. Use the diagram below to answer the following questions. Show your work. (6 marks)



$$\begin{aligned} x^2 &= 20^2 + 30^2 \\ &= 400 + 900 \\ &= 1300 \checkmark \\ x &= \sqrt{1300} \checkmark \\ x &= 36.1 \checkmark \end{aligned}$$

- a. What length of fencing is needed to surround this triangular section of land, to the nearest metre?

$$\begin{aligned} P &= 20\text{ m} + 30\text{ m} + 36\text{ m} \checkmark \\ &= 86\text{ m} \checkmark \end{aligned}$$

- b. What is the area of the triangular section of land?

$$\begin{aligned} A &= \frac{1}{2} (20)(30) \checkmark \\ &= 300\text{ m}^2 \checkmark \end{aligned}$$

PROPORTIONAL REASONING

4. An 84 m² condo in a new apartment block sells for \$235 000. If the cost per square foot is the same throughout the building, what is the price of a 140 m² condo? Round the answer to the nearest thousand. (3 marks)

$$(140) \frac{x}{140} = \frac{235\,000}{84} (140)$$

$$x = 391\,666.67$$

∴ A 140m² condo would cost \$392 000

5. Patrick borrowed \$600 for 8 months. The annual interest rate is 21%. (5 marks)

- a. How much interest will Patrick owe at the end of 8 months?

$$I = 600(0.21)\left(\frac{8}{12}\right) \quad \checkmark$$

$$= 84 \quad \checkmark$$

∴ He will owe \$84 in interest \checkmark

- b. How much will he have to pay back at the end of 8 months?

$$600 + 84 \quad \checkmark$$

$$= 684$$

∴ He will have to pay a total of \$684 \checkmark

RELATIONS

6. Use the data in the table below to answer the following questions. (6 marks)

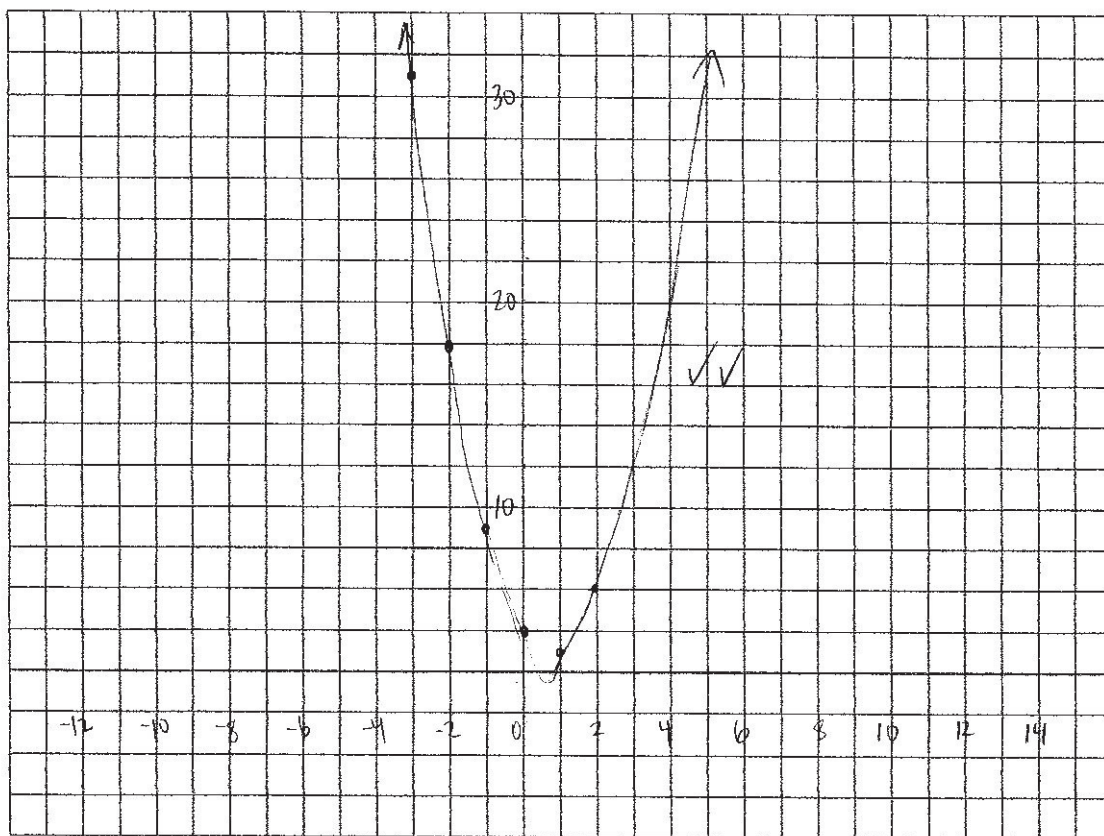
x	y	1 st Differences	2 nd Differences
-3	31	-13	4
-2	18	-9	4
-1	9	-5	4
0	4	-1	4
1	3	3	
2	6		

$$y = 3\left(x - \frac{1}{2}\right)^2 - \frac{3}{4}$$

- a. State whether the relation is linear, quadratic or neither. Explain your reasoning.

Quadratic → 2nd differences are constant $\checkmark \checkmark$

b. Graph the data. Draw line/curve of best fit.



7. For the graph state and label each of the following. (8 marks)

a. the coordinates of the vertex

$$(1, -2) \quad \checkmark$$

b. the equation of the axis of symmetry

$$x = 1 \quad \checkmark$$

c. the x- and y-intercepts

$$x \rightarrow -1 \text{ and } 3 \quad \checkmark$$

$$y \rightarrow -1.5 \text{ (or } -\frac{3}{2}) \quad \checkmark$$

d. the maximum/minimum value

$$\text{min} \rightarrow -2 \quad \checkmark$$

e. the equation of the parabola

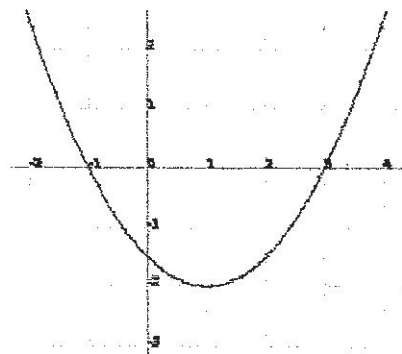
$$y = a(x+1)(x-3)$$

$$-2 = a(1+1)(1-3) \quad \checkmark$$

$$-2 = a(2)(-2)$$

$$-2 = -4a$$

$$\frac{1}{2} = a \quad \checkmark$$



$$\therefore y = \frac{1}{2}(x+1)(x-3) \quad \checkmark$$

LINEAR RELATIONS

8. Karen wants to rent a moving truck for 1 day. She is comparing prices from two rental companies:

Company A charges \$40 plus \$0.49 per km

Company B charges \$71 plus \$0.18 per km

(7 marks)

- a. Write an equation to model the cost for each company. Use C to represent the cost in dollars and d to represent the distance in km.

$$A: C = 0.49d + 40 \quad \checkmark$$

$$B: C = 0.18d + 71 \quad \checkmark$$

- b. Which company should Karen choose if she is moving 50 km away? Explain your reasoning.

Company A

$$C = 0.49(50) + 40$$

$$= 24.50 + 40$$

$$= 64.50$$

Company B

$$C = 0.18(50) + 71$$

$$= 9 + 71$$

$$= 80$$

Karen should choose Company B because the # of kms is small enough to make it the cheaper option $\checkmark \checkmark$

9. A company is having business cards printed. The cost to design the business card is \$25. There is an additional charge of \$0.02 per business card printed. (5 marks)

- a. Identify the fixed cost and the variable cost for the situation.

Fixed: \$25 \checkmark

Variable: \$0.02 \checkmark

- b. Write an equation representing this relationship.

$$y = 0.02x + 25 \quad \checkmark$$

- c. Use your equation to determine the total cost of 500 business cards.

$$y = 0.02(500) + 25 \quad \checkmark$$

$$y = 10 + 25$$

$$y = 35 \quad \checkmark$$

10. Rick invested \$15 000 in 2 investments: one that pays 8% interest and one that pays 5% interest. If he receives \$1035 in interest at the end of one year, how much did he invest at each rate of interest?

(6 marks)

Let x = 1st investment (@ 8%) 1/2

Let y = 2nd investment (@ 5%)

$$x + y = 15000 \rightarrow y = 15000 - x \quad \checkmark$$

$$0.08x + 0.05y = 1035 \quad \checkmark$$

$$0.08x + 0.05(15000 - x) = 1035$$

$$0.08x + 750 - 0.05x = 1035 \quad \checkmark$$

$$0.03x = 285 \quad \checkmark$$

$$x = 9500$$

$$y = 15000 - 9500 \quad \checkmark$$

$$= 5500$$

check: $x + y = 15000$

$$9500 + 5500 = 15000$$

$$15000 = 15000$$

$$LS = RS$$

\therefore He invested \$9500 @ 8% 1/2
and \$5500 @ 5%.

POLYNOMIALS

11. Solve. (4 marks)

a. $x + 9 = 3 - x$

$$2x = -6 \quad \checkmark$$

$$x = -3 \quad \checkmark$$

ch

$$3 + 9 = 3 - (-3)$$

$$6 = 6$$

$$LS = RS$$

b. $\frac{x-5}{7} = 3 \quad (1)$

$$x - 5 = 21 \quad \checkmark$$

$$x = 26 \quad \checkmark$$

ch

$$\frac{26-5}{7} = 3$$

$$\frac{21}{7} = 3$$

$$3 = 3$$

$$LS = RS$$

12. Simplify. (12 marks)

a. $(5x^2 + 7x - 4) - (6x^2 + 9x - 3)$
 $= 5x^2 + 7x - 4 - 6x^2 - 9x + 3$ ✓
 $= 5x^2 - 6x^2 + 7x - 9x - 4 + 3$
 $= -x^2 - 2x - 1$ ✓

b. $3(x^2 - 2x + 7)$
 $= 3x^2 - 6x + 21$ ✓

c. $3x(4x + 3) - x(2x + 3)$
 $= 12x^2 + 9x - 2x^2 - 3x$ ✓
 $= 12x^2 - 2x^2 + 9x - 3x$
 $= 10x^2 + 6x$ ✓

d. $\frac{(x^6)^3 (x^3)^2}{(x^9)^2}$
 $= \frac{(x^{18})(x^6)}{x^{18}}$ ✓
 $= \frac{x^{24}}{x^{18}}$
 $= x^6$ ✓

e. $-4[3 - 2(x + 5) - 4x]$
 $= -4(3 - 2x - 10 - 4x)$ ✓
 $= -4(-6x - 7)$
 $= 24x + 28$ ✓

f. $(x + 3)(x - 5)$
 $= x^2 - 5x + 3x - 15$
 $= x^2 - 2x - 15$ ✓

g. $2(3x + 1)(x - 4)$
 $= 2(3x^2 - 12x + x - 4)$ ✓
 $= 2(3x^2 - 11x - 4)$
 $= 6x^2 - 22x - 8$ ✓

13. Factor. (4 marks)

a. $18x - 27$

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

b. $x^2 - 36$

$$= (x - 6)(x + 6)$$

c. $x^2 - 3x - 28$

$$= (x - 7)(x + 4)$$

d. $x^2 + 10x + 25$

$$= (x + 5)^2$$

14. Evaluate. (2 marks)

a. 8^0

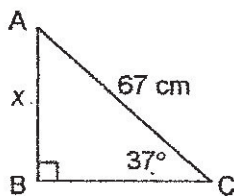
$$= 1 \quad \checkmark$$

b. $\left(\frac{4}{3}\right)^{-1}$

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

15. Find the missing side length or angle specified. (5 marks)

a.



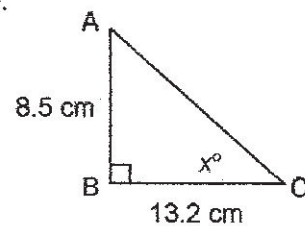
$$\sin 37^\circ = \frac{x}{67}$$

$$67 \sin 37^\circ = x$$

$$40.3 = x$$

SOH-CAH-TOA

b.



$$\tan x^\circ = \frac{8.5}{13.2}$$

$$x^\circ = \tan^{-1}\left(\frac{8.5}{13.2}\right)$$

$$x^\circ = 32.8^\circ \quad (\text{or } 33^\circ)$$