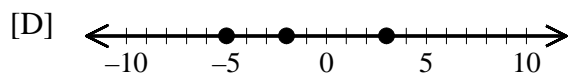
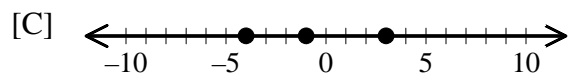
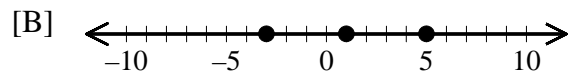
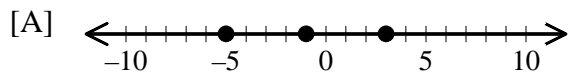


*Scrap paper is available but write your final solution clearly in the space provided*

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1. Write 82% as a decimal.

2. Which of the following number lines shows the graph of 3, -1, and -5?



3. Write each ratio in simplest form.

- a)  $\frac{25}{45}$       b)  $\frac{24}{18}$       c)  $\frac{12}{90}$       d) 57:19

4. Simplify. a)  $-3 + (-4)^2$

b)  $(2)^3 - 5$

c)  $-3^2 \times 4$

d)  $(-2)^3 - (-1)$

e)  $-2 + (-3)^2 \times 2$

f)  $(-4)(4 - 5)^2 - (-2)^2$

*Scrap paper is available but write your final solution clearly in the space provided*

---

[1] 0.82 \_\_\_\_\_

[2] A \_\_\_\_\_

[3] a)  $\frac{5}{9}$    b)  $\frac{4}{3}$    c)  $\frac{2}{15}$    d) 3:1  
\_\_\_\_\_

[4] a) 13   b) 3   c) -36   d) -7   e) 16   f) -8  
\_\_\_\_\_

[5] B \_\_\_\_\_

[6] A \_\_\_\_\_

a)  $w = 70^\circ, x = 70^\circ, y = 70^\circ, z = 70^\circ$

b)  $x = 60^\circ, y = 60^\circ$

[7] c)  $x = 40^\circ, y = 40^\circ, z = 100^\circ$   
\_\_\_\_\_

[8] B \_\_\_\_\_

**Entrance to Grade 9 - Essential Mathematics (MAT1L)**

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---

[1] D

[2] a) 5, 4, 3, 2, 1 b) 1, 0, -1, -2, -3

[3] B

[4] a) 3 b) -3 c) 1 d) 7

[5] -22

[6] 0.0875

	Percent	Fraction Out of 100	Decimal
a)	700%	$\frac{700}{100}$	7.0
b)	225%	$\frac{225}{100}$	2.25
c)	154%	$\frac{154}{100}$	1.54
d)	369%	$\frac{369}{100}$	3.69

[7] \_\_\_\_\_

[8] A

**Entrance to Grade 9 - Essential Mathematics (MAT1L)**

Scrap paper is available but write your final solution clearly in the space provided

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1. Subtract.  $5\frac{1}{3} - 2\frac{1}{2}$     [A]  $\frac{11}{12}$                       [B]  $-1\frac{1}{6}$                       [C]  $4\frac{11}{12}$                       [D]  $2\frac{5}{6}$

2. Complete the tables.

a)

$a$	$a + 3$
2	
1	
0	
-1	
-2	

b)

$x$	$(-1) + x$
2	
1	
0	
-1	
-2	

3. Add.  $(-5) + (+7) + (-8)$     [A] 20                      [B] -6                      [C] 6                      [D] -4

4. Simplify.

a)  $\frac{(-2)(+6)}{(-4)}$

b)  $\frac{4(+9)}{(-6)(+2)}$

c)  $\frac{(-75)}{(-15)(+5)}$

d)  $\frac{9(-7)}{(-3)(+3)}$

5. Add.  $(-3) + (-19)$

6. Write  $8\frac{3}{4}\%$  as a decimal.

7. Complete the table.

	Percent	Fraction Out of 100	Decimal
a)	700%		
b)	225%		
c)		$\frac{154}{100}$	
d)			3.69

8. Which rational number has a numerator less than  $-1$  and a denominator greater than 1?

[A]  $\frac{-9}{9}$

[B]  $\frac{-3}{1}$

[C]  $\frac{-6}{-2}$

[D]  $\frac{-1}{4}$

**Entrance to Grade 10 Applied - Foundations of Mathematics (MPM2P)**

*Scrap paper is available but write your final solution clearly in the space provided*

---

[1]  $8\frac{7}{10}$  \_\_\_\_\_

[2] C \_\_\_\_\_

[3] Jacques, by \$0.30/h \_\_\_\_\_

[4]  $y + 6 = \frac{2}{5}(x - 2); y = \frac{2}{5}x - \frac{34}{5}$  \_\_\_\_\_

[5] 18 \_\_\_\_\_

[6] D \_\_\_\_\_

[7]  $\angle 1 = 125^\circ, \angle 3 = 55^\circ$  \_\_\_\_\_

[8] 2 \_\_\_\_\_

**Entrance to Grade 10 Academic - Principles of Mathematics (MPM2D)**

Scrap paper is available but write your final solution clearly in the space provided

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a)  $1.5c^2 - 0.15c$

b)  $w^3 - 3w^2 + 6w - 4$

[1] c)  $2x^2y + 6x^2 - x + \frac{4}{3}y$ 

---

[2] a)  $0.25d^6$  b)  $5.4a^5b^7$  c)  $-12.1k^8$  d)  $-108r^7s^9t^8$ 

---

	Cost Price	Markup	Selling Price
a)	\$3.50	20%	\$4.20
b)	\$12.00	25%	\$15.00
c)	\$11.70	30%	\$15.21
d)	\$54.74	15%	\$62.95

[3] 

---

[4] 15 years and 44 years

---

[5]  $-\frac{2}{11}$ 

---

[6] 243, 729, 2187

---

[7]  $49 \text{ m}^2$ 

---

[8]  $x = 128^\circ$ 

---

**Entrance to Grade 10 Academic - Principles of Mathematics (MPM2D)**

Scrap paper is available but write your final solution clearly in the space provided

---

1. Expand.

a)  $0.3(5c^2 - 0.5c)$

b)  $-0.5(-2w^3 + 6w^2 - 12w + 8)$

c)  $\frac{1}{3}(6x^2y + 18x^2 - 3x + 4y)$

2. Simplify. a)  $(0.5d^3)^2$     b)  $(0.2a^2b)(3ab^2)^3$     c)  $-(0.1k^2)(-11k^3)^2$     d)  $(-3rst^2)^3(2r^2s^3t)^2$

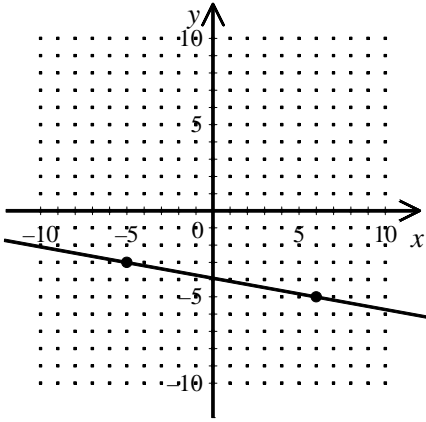
3. Complete the table.

	Cost Price	Markup	Selling Price
a)	\$3.50	20%	
b)	\$12.00	25%	
c)	\$11.70	30%	
d)	\$54.74	15%	

4. The sum of the ages of Petra and her mother is 59. Her mother is 14 years more than twice as old as Petra. How old are Petra and her mother?

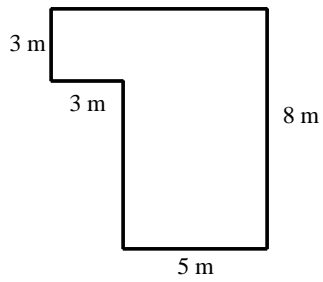


5. Find the slope of the line.

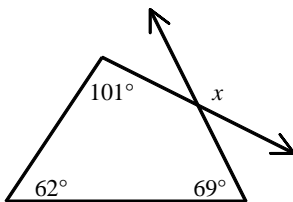


6. Identify the next three terms in the sequence. 3, 9, 27, 81, ...

7. Find the area of the composite shape.



8. Find the value of  $x$ .



**Entrance to Grade 10 Applied - Foundations of Mathematics (MPM2P)**

*Scrap paper is available but write your final solution clearly in the space provided*

---

1. Estimate, then multiply.  $4\frac{5}{6} \times 1\frac{4}{5}$

2. Simplify.  $\frac{35x^7}{-7x^5}$       [A]  $5x^2$       [B]  $-x^2$       [C]  $-5x^2$       [D]  $-5x^{12}$

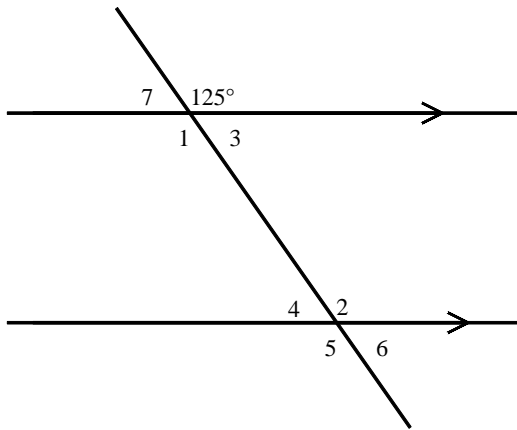
3. Gerrie was paid \$68.00 for 8 h of work. Jacques received \$61.60 for 7 h. Who had the higher rate of pay and by how much?

4. Write an equation of the line that passes through the point  $(2, -6)$  and has slope  $\frac{2}{5}$ . Then, rewrite the equation in slope and y-intercept form.

5. Find the mode of the data.  
14, 17, 18, 13, 17, 18, 14, 13, 18, 15

6. Solve.  $-4n + 19 + 2n + 23 = -4$     [A]  $\frac{23}{3}$     [B] 0    [C] -19    [D] 23

7. Find the measures of  $\angle 1$  and  $\angle 3$ .



8. Solve.  $3.3x - 0.7 = 0.6x + 4.7$

*Scrap paper is available but write your final solution clearly in the space provided*

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1. **Application** Name the type of quadrilateral formed when the lines  $x = 7$ ,  $2x + 3y - 7 = 0$ ,  $x - 3y = 0$ , and  $2x + 3y = -10$  intersect.

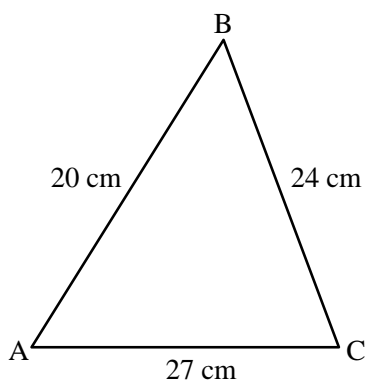
2. **Problem Solving** The width of a rectangle is 3 m less than the length. The area of the rectangle is  $10 \text{ m}^2$ . Find the dimensions of the rectangle.

3. State whether each set of ordered pairs represents a function.

a)  $\{(0, 5), (1, 4), (2, 3), (3, 2)\}$       b)  $\{(2, -3), (3, -2), (4, -1), (5, 0)\}$

c)  $\{(3, 7), (5, 9), (7, 7), (9, 7)\}$       d)  $\{(-1, 0), (-1, 3), (1, 0), (1, 3)\}$

4. In the given triangle, name the largest angle. The triangle is not drawn to scale.



5. Expand and simplify.

a)  $(a-6)^2 + (a+5)^2$

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

c)  $3(t-1)(t+1) - 4(t-1)^2$

d)  $5(3d-2)^2 - 3(3-d)^2$

6. **Problem Solving** A small park is enclosed by 180 m of fencing. The area of the park is  $2016 \text{ m}^2$ . What are the dimensions of the park?

7. Factor.  $8x^3 - 72x^2 + 48x^2 - 432x$

[A]  $(8x-10)(8x+7)$

[B]  $x(8x-10)(8x+7)$

[C]  $8x(x-9)(x+6)$

[D]  $8(x-9)(x+6)$

8. State the coordinates of the vertex of the parabola. Then, use a graphing calculator or graphing software to determine any  $x$ -intercepts. Round to the nearest tenth, if necessary.  $y = -1.8(x-2)^2 + 3$

Scrap paper is available but write your final solution clearly in the space provided

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[1] trapezoid \_\_\_\_\_

[2] 5 m by 2 m \_\_\_\_\_

[3] a) yes b) yes c) yes d) no \_\_\_\_\_

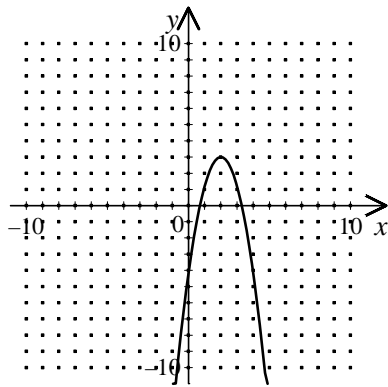
[4] B \_\_\_\_\_

a)  $2a^2 - 2a + 61$       b)  $2x^2 - 14x + 40$

[5] c)  $-t^2 + 8t - 7$       d)  $42d^2 - 42d - 7$  \_\_\_\_\_

[6] 48 m by 42 m \_\_\_\_\_

[7] C \_\_\_\_\_



[8] vertex (2, 3); x-intercepts: 0.7, 3.3 \_\_\_\_\_

Scrap paper is available but write your final solution clearly in the space provided

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1. Factor.  $3x^2 + 13x + 12$

[A]  $(3x + 4)(x - 3)$

[B]  $(3x + 4)(x + 3)$

[C]  $(3x - 4)(x - 3)$

[D]  $(x + 3)(3x - 4)$

2. **Communication** The table gives the area and three side lengths for two similar right triangles. Describe the relationship between the ratio of the lengths of the corresponding sides and the ratio of the areas.

	Area (m <sup>2</sup> )	Side 1	Side 2	Side 3
Triangle A	24	6	8	10
Triangle B	96	12	16	20

3. **Application** The lengths of two similar rectangles are 14 cm and 11 cm. What is the ratio of the corresponding side lengths? the areas?

4. Write the equation of the circle, given its centre and radius.  
centre (0, 0), radius 7

[A]  $x^2 + y^2 = 14$

[B]  $\frac{x^2}{14} + \frac{y^2}{14} = 1$

[C]  $x^2 + y^2 = 7$

[D]  $x^2 + y^2 = 49$

5. Find the midpoint of the line segment with endpoints  $(-8, 5)$  and  $(-5, 3)$ .

[A]  $\left(-\frac{3}{2}, 1\right)$

[B]  $(-13, -8)$

[C]  $\left(-\frac{3}{2}, -1\right)$

[D]  $\left(-\frac{13}{2}, 4\right)$

6. Factor.  $9x^3 - 81x^2 + 36x^2 - 324x$

[A]  $9x(x-9)(x+4)$

[B]  $(9x-10)(9x+5)$

[C]  $x(9x-10)(9x+5)$

[D]  $9(x-9)(x+4)$

7. Sketch the graph of each parabola. Determine any intercepts, to the nearest tenth, and find two other points on the graph.

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

b)  $y = 3(x-1)^2 - 2$

c)  $y = -1.5(x+1)^2 + 3$

d)  $y = 3(x-2)^2 + 4$

8. Solve the system of equations by substitution or elimination. Check the solution.

a)  $x - 2y = 0$

b)  $2x + 3y = 41$

c)  $3x + 5y = -37$

$3x + 2y = 16$

$4x + 5y = 71$

$4x + 7y = 19$

d)  $y = \frac{7}{5}x + 5$

e)  $13 = 4x - 3y$

f)  $3y = \frac{4}{5}x - 1$

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

$5x = 59 + 6y$

$6x - 5y - 4 = 0$



*Scrap paper is available but write your final solution clearly in the space provided*

[1] B

The ratio of the areas of two similar triangles is equivalent to the square of the ratio of the side lengths.

[2] If the ratio of the side lengths of triangle A to triangle B is 1:2, then the ratio of the areas is 1:4.

[3] 14:11; 196:121

[4] D

[5] D

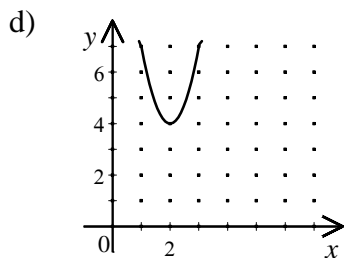
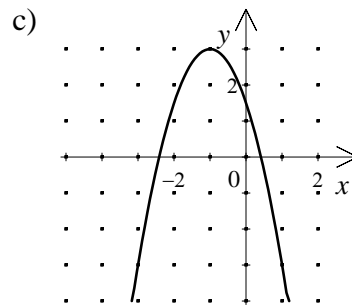
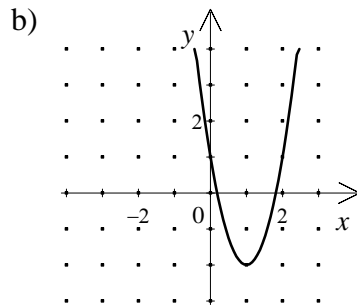
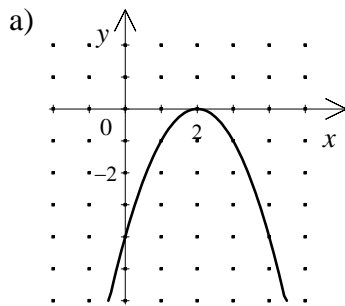
[6] A

a)  $x$ -intercept 2;  $y$ -intercept  $-4$ ;  $(1, -1)$ ,  $(3, -1)$ ,  $(4, -4)$ ,  $(5, -9)$ , ...

b)  $x$ -intercepts 1.8 and 0.2;  $y$ -intercept 1;  $(1, -2)$ ,  $(2, 1)$ ,  $(3, 10)$ ,  $(-1, 10)$ , ...

c)  $x$ -intercepts  $-2.4$  and  $0.4$ ;  $y$ -intercept 1.5;  $(0, 1.5)$ ,  $(-2, 1.5)$ ,  $(1, -3)$ ,  $(-3, -3)$ , ...

d) no  $x$ -intercept;  $y$ -intercept 16;  $(1, 7)$ ,  $(2, 4)$ ,  $(3, 7)$ ,  $(4, 16)$ , ...



[7]

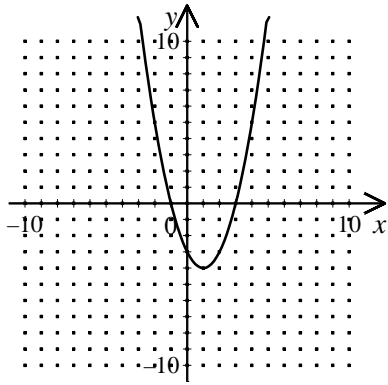
a)  $(4, 2)$  b)  $(4, 11)$  c)  $(-4, -5)$

[8] d)  $(-\frac{5}{2}, \frac{3}{2})$  e)  $(-11, -19)$  f)  $(\frac{1}{2}, -\frac{1}{5})$

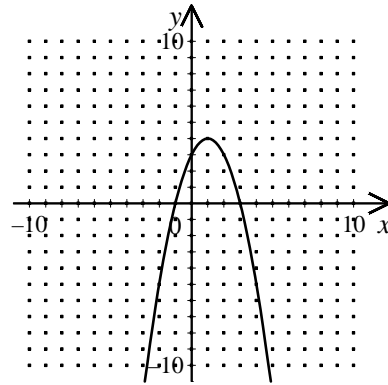
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1. Graph  $y = (x+1)^2 - 4$ .

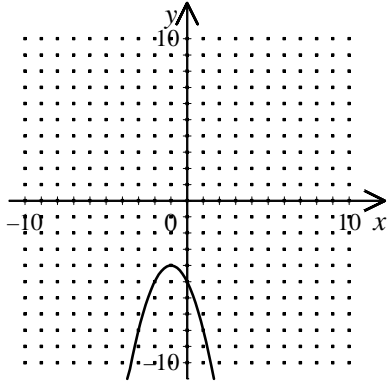
[A]



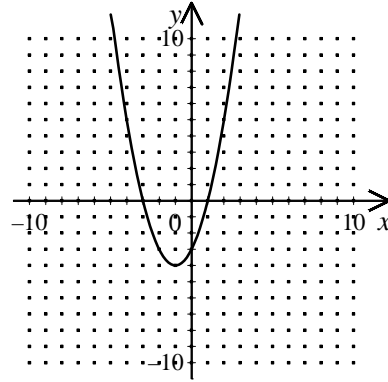
[B]



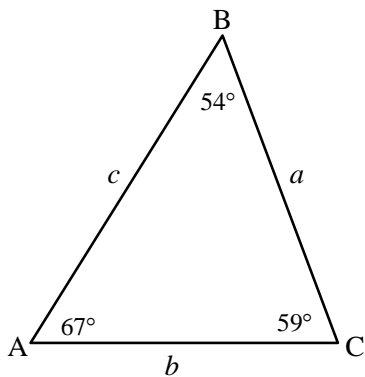
[C]



[D]

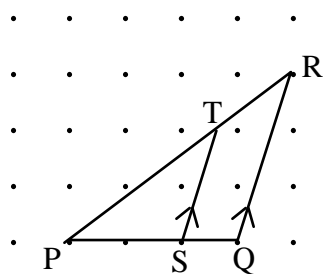


2. In the given triangle, name the longest side length. The triangle is not drawn to scale.



3. **Communication**  $\Delta PQR$  and  $\Delta PST$  are similar. Explain how to calculate each ratio.

- a)  $\frac{PR}{PT}$       b)  $\frac{ST}{QR}$       c)  $\frac{\text{area of } \Delta PST}{\text{area of } \Delta PQR}$



4. Solve each system by elimination. If there is exactly one solution, check the solution.  $2x - y = 4$

$$x + y = 5$$

[A] (10, 2)

[B] (0, -4)

[C] (2, 0)

[D] (3, 2)

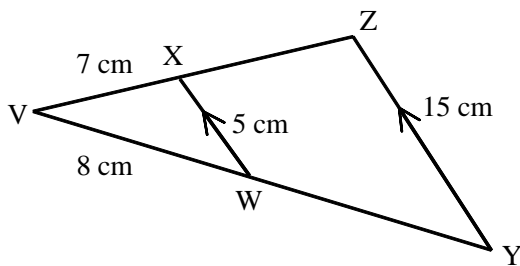
5. **Problem Solving** The area of a triangle is represented by the polynomial  $x^2 + 3x - 18$ . The base of the triangle is represented by  $x + 6$ .

a) Factor  $x^2 + 3x - 18$ .

b) Write a binomial that represents the altitude of the triangle.

c) Find the area of the triangle if  $x = 12$ .

6.  $\triangle VWX \sim \triangle VYZ$ . Find  $VY$ ,  $WY$ ,  $VZ$ , and  $XZ$ .



7. The diameter of a circle joins the points  $C(0, 7)$  and  $D(5, 1)$ . What are the coordinates of the centre of the circle?

8. **Application** Write an equation for each function.

a)

$x$	$y$
0	1
1	4
2	7
3	10
4	13

b)

$x$	$y$
0	6
1	4
2	2
3	0
4	-2

c)

$x$	$y$
0	7
1	5
2	5
3	7
4	11

d)

$x$	$y$
0	2
1	7
2	22
3	47
4	82

*Scrap paper is available but write your final solution clearly in the space provided*

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[1] D

[2] a

[3] a)  $\frac{PR}{PT} = \frac{PQ}{PS} = \frac{4}{2} = \frac{2}{1}$     b)  $\frac{ST}{QR} = \frac{PS}{PQ} = \frac{1}{2}$     c)  $\frac{PS}{PQ} = \frac{1}{2}$  so  $\frac{\text{area of } \Delta PST}{\text{area of } \Delta PQR} = \frac{1^2}{2^2} = \frac{1}{4}$

---

[4] D

a)  $(x+6)(x-3)$

b)  $2x-6$

[5] c) 162

[6] VY = 24 cm, WY = 16 cm, VZ = 21 cm, and XZ = 14 cm

[7]  $\left(\frac{5}{2}, 4\right)$

a)  $y = 3x + 1$

b)  $y = -2x + 6$

c)  $y = x^2 - 3x + 7$

[8] d)  $y = 5x^2 + 2$

Scrap paper is available but write your final solution clearly in the space provided

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1. **Application** The vertex of a parabola is  $(2, -5)$ . One  $x$ -intercept is  $-3$ . What is the other  $x$ -intercept?

2. Find the axis of symmetry of the parabola.  $y = x^2 + x - 6$

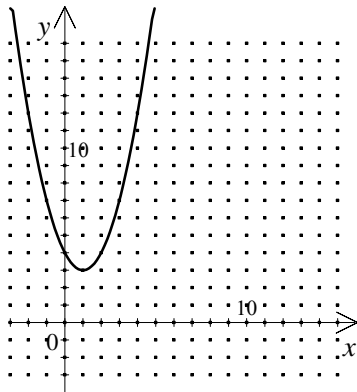
[A]  $x = -1$

[B]  $x = \frac{1}{2}$

[C]  $x = 1$

[D]  $x = -\frac{1}{2}$

3. **Communication** Write the equation that represents the graph. Explain your reasoning.



4. **Communication** None of the following trinomials is a perfect square. Change one term in each trinomial to make a perfect square. Explain your reasoning.

a)  $a^2 + 17ab + 36b^2$     b)  $t^2 - 8t + 15$     c)  $9x^2 + 7xy + y^2$     d)  $c^2 + cd + d^2$

5. Find the shortest distance from the origin to each line, to the nearest tenth.

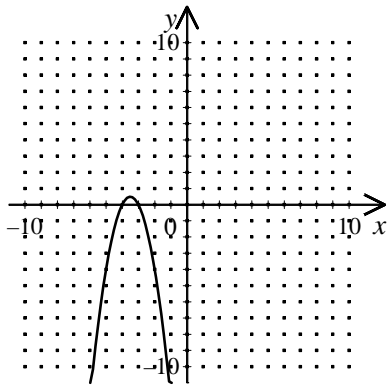
a)  $x + y = -2$     b)  $3x - 2y = 6$     c)  $4x = -5y + 20$     d)  $y + 3x - 6 = 0$

6. **Application** For the equation  $y = 2x^2 + 14x + 24$ ,
- find the axis of symmetry of the graph of the equation
  - find the vertex of the graph
  - graph the equation

[A] a)  $x = -\frac{7}{2}$

b) vertex  $\left(-\frac{7}{2}, \frac{1}{2}\right)$

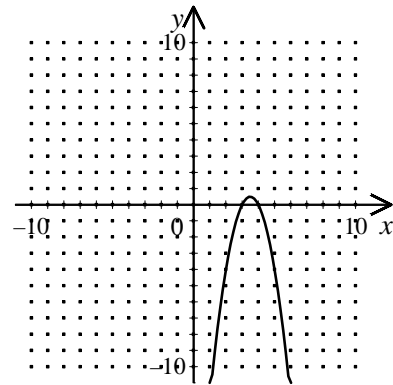
c)



[B] a)  $x = \frac{7}{2}$

b) vertex  $\left(\frac{7}{2}, \frac{5}{8}\right)$

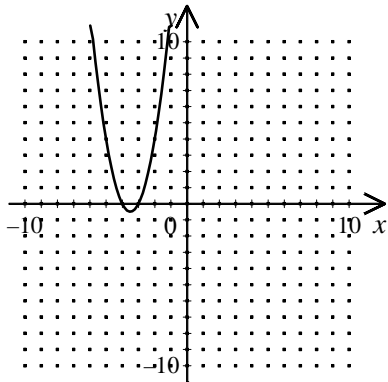
c)



[C] a)  $x = -\frac{7}{2}$

b) vertex  $\left(-\frac{7}{2}, -\frac{1}{2}\right)$

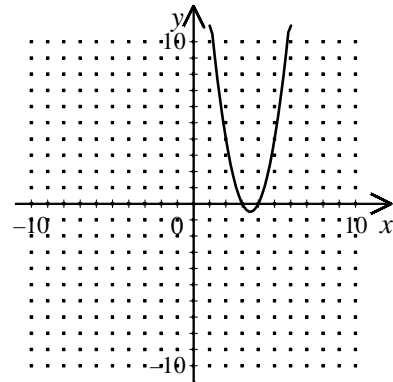
c)



[D] a)  $x = \frac{7}{2}$

b) vertex  $\left(\frac{7}{2}, -\frac{3}{8}\right)$

c)



7. Triangle XYZ has vertices X(2, 1), Y(1, -3), and Z(6, -2). Find the midpoints, A and B, of XY and XZ, respectively, and show that AB is parallel to YZ.

8. **Problem Solving** Find two numbers whose sum is 44 and whose product is a maximum.

*Scrap paper is available but write your final solution clearly in the space provided*

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[1] 7 \_\_\_\_\_

[2] D \_\_\_\_\_

The vertex, which has the form  $(h, k)$ , is  $(1, 3)$ . The equation, which has the form  $y = a(x - h)^2 + k$ , is

[3]  $y = (x - 1)^2 + 3$ .

---

a) The first and the last terms are perfect squares. Double the product of their square roots,  $a$  and  $6b$ , to get  $12ab$  as the middle term. Check  $(a + 6b)^2$ .

b) Change the last term to 16 to make it a perfect square. Then, check  $(t - 4)^2$ .

c) The first and last terms are perfect squares. Double the product of their square roots,  $3x$  and  $y$ , to get  $6xy$  as the middle term. Check  $(3x + y)^2$ .

[4] d) the middle term should be double  $cd$ , or  $2cd$ . Check  $(c + d)^2$ .

---

[5] a) 1.4 b) 1.7 c) 3.1 d) 1.9 \_\_\_\_\_

[6] C \_\_\_\_\_

[7]  $A\left(\frac{3}{2}, -1\right), B\left(4, -\frac{1}{2}\right)$ ; The slopes of AB and YZ are both  $\frac{1}{5}$ .

---

[8] 22 and 22 \_\_\_\_\_

**Entrance to Grade 12 Mathematics for College Technology (MCT4C)**

*Scrap paper is available but write your final solution clearly in the space provided*

1. Mary saved \$2500 from her summer job and invested it at 4% per annum compounded monthly. How much will she have four years later when she attends college?

2. Solve each of the following:

a.  $3^x + 6 = 87$

c.  $4^{x+1} - 22 = 42$

b.  $5(2^x) - 160 = 0$

d.  $\frac{3^{x-1}}{6} = \frac{81}{2}$

3. Simplify each of the following:

a.  $(x^2 + 3x - 4) - (x - 1)^2$

c.  $(x + 3)^2 - 2(x + 1)$

b.  $2(x + 3)(x - 1)$

d.  $(2x + 3)^2 - 3(x + 2)^2$

4. State any restrictions on the variable in each of the following:

a.  $\frac{3x + 7}{7}$

c.  $\frac{2x^2 + 5x - 9}{x - 5}$

b.  $\frac{4y - 5}{y^2 - 7y + 12}$

d.  $\frac{y + 7}{y^2 + 2y - 15}$



5. Simplify each of the following:

a.  $\frac{(2x^2y)^3}{4x^3y^4}$

c.  $(4xy^2)^{\frac{1}{2}}(9x^3y^4)^{\frac{1}{2}}$

b.  $(2x^2y)^3(3x^2y^4)^{-2}$

d.  $\frac{3x^2y^4}{15(xy^2)^3}$

6. Solve each of the following for  $x$ .

a.  $x^2 + 81 = 0$

c.  $x^2 + 15 = -12$

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

d.  $(x+2)(x+5) = (x-4)^2$

7. Convert the following to radian measure.

a.  $330^\circ$

b.  $48^\circ$

c.  $-510^\circ$

8. Simplify each of the following:

a.  $\frac{m^{2a+3} \cdot m^{a-2}}{m^{a+1} \cdot m^{a-1}}$

b.  $\sqrt{\frac{a^{\frac{1}{4}} \cdot a^{\frac{1}{2}}}{\sqrt{a}}}$

**Entrance to Grade 12 Mathematics for College Technology (MCT4C)**

*Scrap paper is available but write your final solution clearly in the space provided*

$$\begin{aligned}
 A &= P(1+i)^n \\
 &= 2500\left(1 + \frac{0.04}{12}\right)^{48} \\
 &= 2933.00
 \end{aligned}$$

[1] Mary will have \$2933.00 four years later.

a.  $3^x + 6 = 87$

$$3^x = 81$$

$$3^x = 3^4$$

$$x = 4$$

c.  $4^{x+1} - 22 = 42$

$$4^{x+1} = 64$$

$$4^{x+1} = 4^3$$

$$x + 1 = 3$$

$$x = 2$$

b.  $5(2^x) - 160 = 0$

$$2^x - 32 = 0$$

$$2^x = 2^5$$

$$x = 5$$

d.  $\frac{3^{x-1}}{6} = \frac{81}{2}$

$$3^{x-1} = 243$$

$$3^{x-1} = 3^5$$

$$x - 1 = 5$$

$$x = 6$$

[2] \_\_\_\_\_

a.  $x^2 + 3x - 4 - (x^2 - 2x + 1)$

$$= x^2 + 3x - 4 - x^2 + 2x - 1$$

$$= 5x - 5$$

c.  $x^2 + 6x + 9 - 2x - 2$

$$= x^2 + 4x + 7$$

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

$$= 2x^2 + 4x - 6$$

d.  $4x^2 + 12x + 9 - 3(x^2 + 4x + 4)$

$$= 4x^2 + 12x + 9 - 3x^2 - 12x - 12$$

$$= x^2 - 3$$

[3] \_\_\_\_\_

a. no restrictions

c.  $x \neq 5$

[4] b.  $y \neq 3, 4$

d.  $y \neq -5, 3$

a.  $\frac{(2x^2y)^3}{4x^3y^4} = \frac{8x^6y^3}{4x^3y^4}$

$$= \frac{2x^3}{y}$$

c.  $(4xy^2)^{\frac{1}{2}}(9x^3y^4)^{\frac{1}{2}} = (36x^4y^6)^{\frac{1}{2}}$

$$= 6x^2y^3$$

b.  $(2x^2y)^3(3x^2y^4)^{-2} = \frac{8x^6y^3}{9x^4y^8}$

$$= \frac{8x^2}{9y^5}$$

d.  $\frac{3x^2y^4}{15(xy^2)^3} = \frac{3x^2y^4}{15x^3y^6}$

$$= \frac{1}{5xy^2}$$

[5] \_\_\_\_\_

a.  $x^2 + 81 = 0$

$$x^2 = -81$$

$$x = \pm\sqrt{-81}$$

$$= \pm 9i$$

c.  $x^2 + 15 = -12$

$$x^2 = -27$$

$$x = \pm\sqrt{-27}$$

$$= \pm 3\sqrt{3}i$$

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

$$3(x^2 - 6x + 9) = x^2 - 3$$

$$3x^2 - 18x + 27 = x^2 - 3$$

$$2x^2 - 18x + 30 = 0$$

$$x^2 - 9x + 15 = 0$$

$$x = \frac{9 \pm \sqrt{21}}{2}$$

[6]

---

d.  $(x+2)(x+5) = (x-4)^2$

$$x^2 + 7x + 10 = x^2 - 8x + 16$$

$$15x = 6$$

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

[7]

---

a.  $330^\circ = 330 \times \frac{\pi}{180} = \frac{11}{6}\pi$

b.  $48^\circ = 48 \times \frac{\pi}{180} = \frac{4}{15}\pi$

c.  $-510^\circ = -510 \times \frac{\pi}{180} = -\frac{17}{6}\pi$

a.  $\frac{m^{2a+3} \cdot m^{a-2}}{m^{a+1} \cdot m^{a-1}} = \frac{m^{3a+1}}{m^{2a}} = m^{a+1}$

b.  $\sqrt{\frac{a^{\frac{1}{4}} \cdot a^{\frac{1}{2}}}{\sqrt{a}}} = \left( \frac{a^{\frac{1}{4}} \cdot a^{\frac{1}{2}}}{a^{\frac{1}{2}}} \right)^{\frac{1}{2}}$

$$= \left( a^{\frac{1}{4}} \right)^{\frac{1}{2}}$$

$$= a^{\frac{1}{8}}$$

[8]

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**Entrance to Grade 11 - Mathematics for Work and Everyday Life (MEL3E)**

*Scrap paper is available but write your final solution clearly in the space provided*

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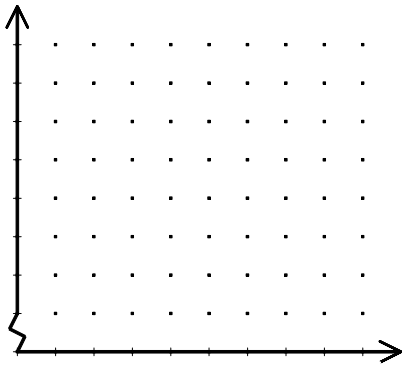
1. A rectangular prism is 11 cm long, 11 cm wide, and 12 cm high. Find the surface area of the prism.
2. The average cost of a computer has decreased since 1978. The following table gives the average computer cost, to the nearest five hundred dollars, for selected years.

Year	Average Computer Cost (\$)
1978	5000
1982	2500
1986	2000
1990	1000

- a) Plot these points on a graph.
  - b) Connect the points using line segments.
  - c) Determine the average yearly decrease in cost between 1978 and 1982.
  - d) Determine the average yearly decrease in cost between 1982 and 1986.
- 
3. Evaluate  $a - b$  for  $a = 5.7$  and  $b = -4.4$ .
  4. Express the unit rate in the units shown.
    - a) 7 cans of punch for \$4.83; ¢/can
    - b) \$61.65 for 8 h of work; \$/h
    - c) 76 h of sunshine in 8 days; h/day
    - d) \$10.75 for 18.7 L of gas; ¢/L

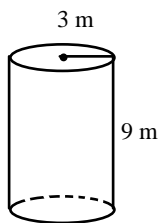
5. The table shows the study times and test scores for a number of students. Draw a scatter plot of score versus time.

Study Time (min)	6	11	15	18	21	24	31	34
Test Score	58	62	59	62	66	70	69	69

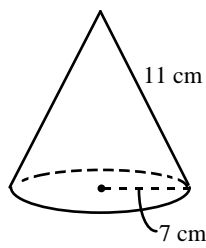


6. Calculate each surface area, to the nearest square unit.

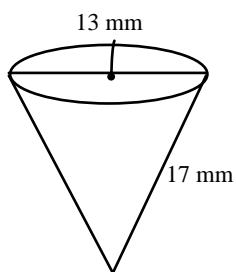
a)



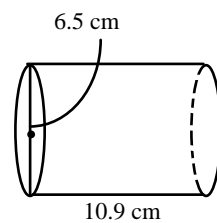
b)



c)



d)



7. Write two ratios equivalent to 4:6.

8. If  $\frac{10}{4}$ ,  $-\frac{18}{8}$ ,  $\frac{9}{6}$ , and  $-\frac{17}{2}$  were placed in order from greatest to least, which would be first?

[A]  $\frac{9}{6}$

[B]  $-\frac{17}{2}$

[C]  $-\frac{18}{8}$

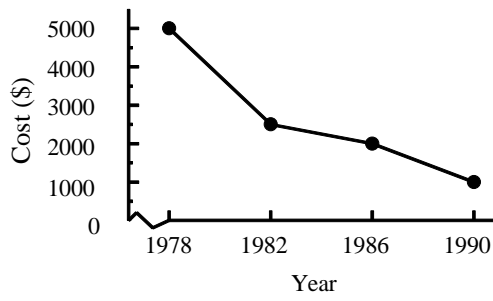
[D]  $\frac{10}{4}$

*Scrap paper is available but write your final solution clearly in the space provided*

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[1] 770 cm<sup>2</sup>

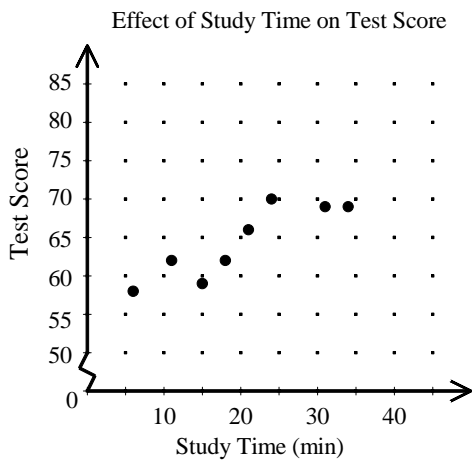
a) and b)



c) \$625  
[2] d) \$125

[3] 10.1

[4] a) 69¢/can   b) \$7.71/h   c) 9.5 h/day   d) 57.5¢/L



[5] \_\_\_\_\_

[6] a) 226 m<sup>2</sup>   b) 396 cm<sup>2</sup>   c) 480 mm<sup>2</sup>   d) 289 cm<sup>2</sup>

[7] Examples: 2:3, 6:9, 8:12, 10:15

[8] D

**Entrance to Grade 12 University Advanced Functions (MHF4U)  
or Mathematics of Data Management (MDM4U)**

*Scrap paper is available but write your final solution clearly in the space provided*

1. Find two integers whose sum is  $-31$  and whose product is  $240$ .

2. The science class is investigating projectiles and they have built catapults. Margarita's team has built a catapult that throws a table-tennis ball vertically upward. The height of the table-tennis ball in centimetres above the ground is given by the formula

$$h = 5 + 50t - 5t^2.$$

- a. At what height is the table-tennis ball released?
- b. What is the ball's maximum height?
- c. If the ball has to stay in the air for  $10$  s to qualify for a prize, can Margarita's team win a prize?

3. Solve each of the following for  $x$ .

a.  $3^{x^2+2x} = 27$

c.  $\frac{1}{4}(2)^{x^2} = 2^x$

b.  $2^{x^2} \times 2^{3x} = \frac{1}{4}$

d.  $3^x \times 81 = 3^{5-x^2}$

4. A mirror frame is  $90$  cm by  $120$  cm. The mirror has an area of  $8800$  cm<sup>2</sup>. How wide is the frame?

5. Solve each of the following:

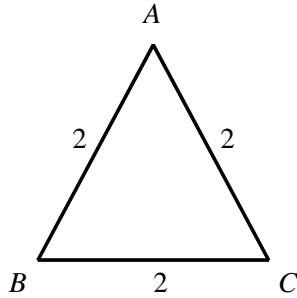
a.  $3^x + 6 = 87$

c.  $4^{x+1} - 22 = 42$

b.  $5(2^x) - 160 = 0$

d.  $\frac{3^{x-1}}{6} = \frac{81}{2}$

6. Given  $\triangle ABC$  with  $AB = BC = AC = 2$ ,



a. draw  $AD \perp BC$ .

b. find  $DC$ .

c. find  $AD$ .

d. find the measure of  $\angle C$ .

e. find the measure of  $\angle DAC$ .

f. find  $\sin 30^\circ$ ,  $\cos 30^\circ$ , and  $\tan 30^\circ$ .

g. find  $\sin 60^\circ$ ,  $\cos 60^\circ$ , and  $\tan 60^\circ$ .

7. Solve each of the following for  $x$ .

a.  $x^2 + 81 = 0$

c.  $x^2 + 15 = -12$

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

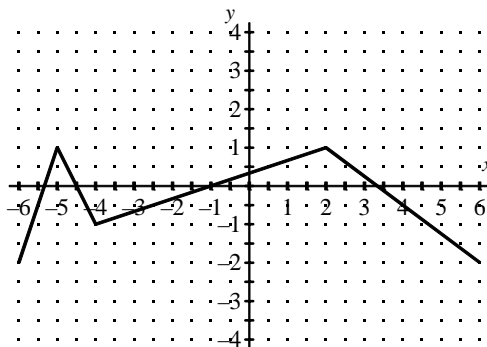
d.  $(x + 2)(x + 5) = (x - 4)^2$

8. From the graph of  $f(x)$  shown

a. graph  $-2f(x)$ .

b. graph  $\frac{3}{4}f(x)$ .

c. graph  $2f(x - 2)$ .





**Entrance to Grade 12 University Advanced Functions (MHF4U)  
or Mathematics of Data Management (MDM4U)**

*Scrap paper is available but write your final solution clearly in the space provided*

Let the integers be represented by  $x$  and  $(-31-x)$ .

$$x(-31-x) = 240$$

$$-31x - x^2 = 240$$

$$x^2 + 31x + 240 = 0$$

$$(x+15)(x+16) = 0$$

$$x = -15, -16$$

If  $x = -15$ , the second integer is  $(-31-x) = -31+15 = -16$ .

If  $x = -16$ , the second integer is  $(-31-x) = -31+16 = -15$ .

[1] The two consecutive integers are -15 and -16.

a. When  $t = 0$ ,  $h = 5$ . The ball is released at 5 cm.

b.  $h = 5 + 50t - 5t^2$

$$= -5(t^2 - 10t + 25) + 5 + 125$$

$$= -5(t-5)^2 + 130$$

The maximum height is 130 m.

c. The ball hits the ground when  $h = 0$ .

$$5 + 50t - 5t^2 = 0$$

$$5t^2 - 50t - 5 = 0$$

$$t^2 - 10t - 1 = 0$$

$$t = \frac{10 \pm \sqrt{100+4}}{2}$$

$$= \frac{10 \pm \sqrt{104}}{2}$$

$$\doteq 10.099 \text{ or } -0.099$$

[2] Time cannot be a negative. The ball stays in the air for 10.1 s and Margarita's team can win a prize.

$$\begin{aligned} \text{a. } 3^{x^2+2x} &= 27 \\ 3^{x^2+2x} &= 3^3 \\ x^2 + 2x &= 3 \\ x^2 + 2x - 3 &= 0 \\ (x+3)(x-1) &= 0 \\ x &= -3, +1 \end{aligned}$$

$$\begin{aligned} \text{c. } \frac{1}{4}(2)^{x^2} &= 2^x \\ 2^{-2}(2)^{x^2} &= 2^x \\ 2^{x^2-2} &= 2^x \\ x^2 - 2 &= x \\ x^2 - x - 2 &= 0 \\ (x-2)(x+1) &= 0 \\ x &= 2, -1 \end{aligned}$$

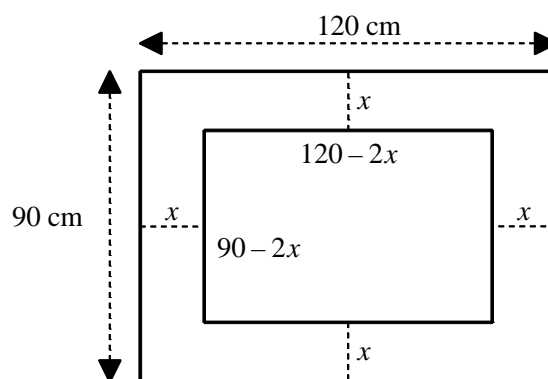
$$\begin{aligned} \text{b. } 2^{x^2} \times 2^{3x} &= \frac{1}{4} \\ 2^{x^2+3x} &= 2^{-2} \\ x^2 + 3x &= -2 \\ x^2 + 3x + 2 &= 0 \\ (x+2)(x+1) &= 0 \\ x &= -2, -1 \end{aligned}$$

$$\begin{aligned} \text{d. } 3^x \times 81 &= 3^{5-x^2} \\ 3^x \times 3^4 &= 3^{5-x^2} \\ 3^{x+4} &= 3^{5-x^2} \\ x+4 &= 5-x^2 \\ x^2 + x - 1 &= 0 \\ x &= \frac{-1 \pm \sqrt{1+4}}{2} \\ &= \frac{-1 \pm \sqrt{5}}{2} \end{aligned}$$

[3]

Let  $x$  represent the width of the frame.

$$\begin{aligned} (90-2x)(120-2x) &= 8800 \\ 10800 - 180x - 240x + 4x^2 &= 8800 \\ 4x^2 - 420x + 2000 &= 0 \\ x^2 - 105x + 500 &= 0 \\ (x-100)(x-5) &= 0 \\ x &= 100, 5 \end{aligned}$$



If  $x = 100$ , the length and width of the mirror would be negative.

[4] Therefore, the width of the frame is 5 cm.

$$\begin{aligned} \text{a. } 3^x + 6 &= 87 \\ 3^x &= 81 \\ 3^x &= 3^4 \\ x &= 4 \end{aligned}$$

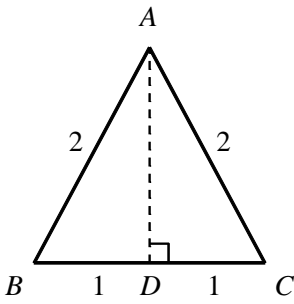
$$\begin{aligned} \text{c. } 4^{x+1} - 22 &= 42 \\ 4^{x+1} &= 64 \\ 4^{x+1} &= 4^3 \\ x+1 &= 3 \\ x &= 2 \end{aligned}$$

$$\begin{aligned} \text{b. } 5(2^x) - 160 &= 0 \\ 2^x - 32 &= 0 \\ 2^x &= 2^5 \\ x &= 5 \end{aligned}$$

$$\begin{aligned} \text{d. } \frac{3^{x-1}}{6} &= \frac{81}{2} \\ 3^{x-1} &= 243 \\ 3^{x-1} &= 3^5 \\ x-1 &= 5 \\ x &= 6 \end{aligned}$$

[5]

a.



b.  $DC = 1$

c.  $2^2 = AD^2 + 1^2$

$AD^2 = 3$

$AD = \sqrt{3}$

d.  $\angle C = 60^\circ$

e.  $\angle DAC = 30^\circ$

f.  $\sin 30^\circ = \frac{1}{2}$

$\cos 30^\circ = \frac{\sqrt{3}}{2}$

$\tan 30^\circ = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

g.  $\sin 60^\circ = \frac{\sqrt{3}}{2}$

$\cos 60^\circ = \frac{1}{2}$

$\tan 60^\circ = \frac{\sqrt{3}}{1} = \sqrt{3}$

[6]

a.  $x^2 + 81 = 0$

$x^2 = -81$

$x = \pm\sqrt{-81}$

$= \pm 9i$

c.  $x^2 + 15 = -12$

$x^2 = -27$

$x = \pm\sqrt{-27}$

$= \pm 3\sqrt{3}i$

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

$3(x^2 - 6x + 9) = x^2 - 3$

$3x^2 - 18x + 27 = x^2 - 3$

$2x^2 - 18x + 30 = 0$

$x^2 - 9x + 15 = 0$

$x = \frac{9 \pm \sqrt{21}}{2}$

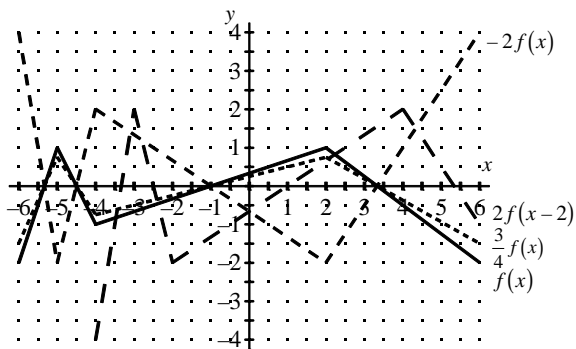
d.  $(x+2)(x+5) = (x-4)^2$

$x^2 + 7x + 10 = x^2 - 8x + 16$

$15x = 6$

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

[7]



[8]