

PART A: MULTIPLE-CHOICE QUESTIONS
(calculator not permitted)

Suggested Time: 30 minutes
Allowable Time: 40 minutes

Value: 12 marks

INSTRUCTIONS: No calculator may be used for this part of the examination. For each question, select the best answer and record your choice on the blue Answer Sheet provided. Using an HB pencil, completely fill in the bubble that has the letter corresponding to your answer. You have a maximum of 40 minutes to work on this section.

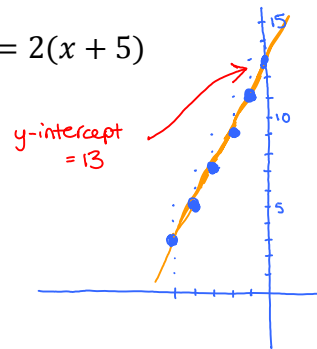
You have Examination Booklet Form A. In the box above #1 on your Answer Sheet, fill in the bubble as follows.

Exam Booklet Form/ Cahier d'examen	A <input checked="" type="radio"/>	B <input type="radio"/>	C <input type="radio"/>	D <input type="radio"/>	E <input type="radio"/>	F <input type="radio"/>	G <input type="radio"/>	H <input type="radio"/>
---------------------------------------	---	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------

1. Determine the y-intercept of the graph of this equation: $y - 3 = 2(x + 5)$

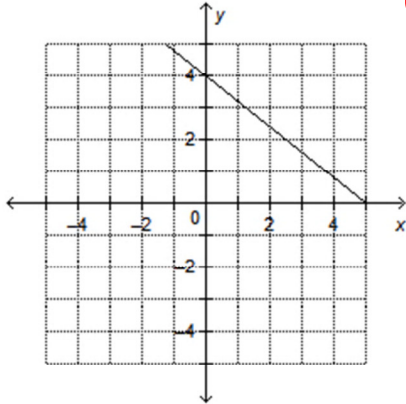
- A. -13 *Method 1: let x=0*
 B. 13 $y - 3 = 2(0 + 5)$
 C. -10 $y - 3 = 2(5)$
 D. 3 $y - 3 = 10$
 $+3$
 $y = 13$

Method 2: Graph
 Point-slope: $y - y_1 = m(x - x_1)$
 $y - (3) = 2(x - (-5))$
 The line passes through point $(-5, 3)$ with slope = 2

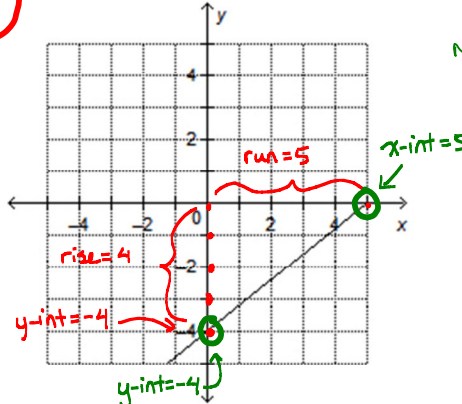


2. Which graph represent the equation $4x - 5y - 20 = 0$?

A.



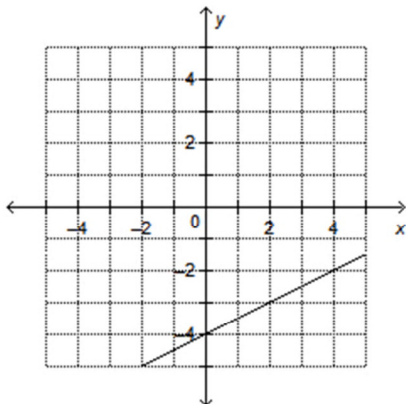
C.



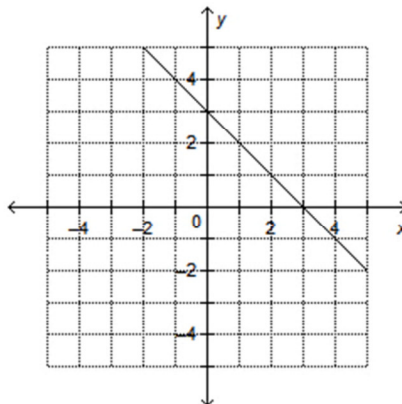
Method 1: Use Intercepts.

x-intercept: y=0
 $4x - 5(0) - 20 = 0$
 $4x - 20 = 0$
 $+20 \quad +20$
 $4x = 20$
 $\frac{4x}{4} = \frac{20}{4}$
 $x = 5$
y-intercept: x=0
 $4(0) - 5y - 20 = 0$
 $-5y - 20 = 0$
 $+20 \quad +20$
 $-5y = 20$
 $\frac{-5y}{-5} = \frac{20}{-5}$
 $y = -4$

B.



D.



Method 2: y = mx + b
 $4x - 5y - 20 = 0$
 $+5y \quad +5y$
 $4x - 20 = 5y$
 $\frac{4x - 20}{5} = \frac{5y}{5}$
 $\frac{4}{5}x - 4 = y$
 $m = \frac{4}{5} \quad b = -4$

3. Write an equation for the line that passes through $U(3, -7)$ and is perpendicular to the line $y = \frac{1}{7}x - 9$. \rightarrow Slope = $\frac{1}{7}$ \rightarrow This is perpendicular to slope = $-\frac{7}{1}$

- A. $y + 7 = -\frac{1}{7}(x + 3)$ *Passes through* $(3, -7)$ **C.** $y + 7 = -7(x - 3)$
 B. $y - 7 = 7(x + 3)$ $\begin{matrix} \uparrow & \uparrow \\ x_1 & y_1 \end{matrix}$ D. $y + 7 = 7(x - 3)$

Point Slope Form: $y - y_1 = m(x - x_1)$
 $y - (-7) = -\frac{7}{1}(x - (3))$
 $y + 7 = -7(x - 3)$

4. Determine the number of solutions of the linear system:

$2x - 5y = 23$ ①
 $-6x + 15y = 21$ ②

- A. one solution
B. no solution
 C. two solutions
 D. infinite solutions

① $2x - 5y = 23$
 $\begin{matrix} -2x & -2x \\ -5y = 23 - 2x \\ -5y = -2x + 23 \\ \frac{-5y}{-5} = \frac{-2x + 23}{-5} \\ y = \frac{2}{5}x - \frac{23}{5} \end{matrix}$

$\text{slope} = \frac{2}{5}$ $\text{slope} = \frac{2}{5}$
 $y\text{-int} = -\frac{23}{5}$ $y\text{-int} = \frac{7}{5}$

Same slope + diff. y-intercept
 \therefore parallel lines \rightarrow no solutions

②. $-6x + 15y = 21$
 $\begin{matrix} +6x & +6x \\ 15y = 21 + 6x \\ \frac{15y}{15} = \frac{6x + 21}{15} \\ y = \frac{2}{5}x + \frac{7}{5} \end{matrix}$

5. The cost for hosting a dinner is given by the formula $C(n) = 60 + 3n$, where C is the total cost, in dollars, and n is the number of people attending the dinner. What is $C(80)$?

- A. 80
 B. 143
 C. 240
D. 300
- $C(n) = 60 + 3n$
 $C(80) = 60 + 3(80)$
 $C(80) = 60 + 240$
 $C(80) = 300$ \leftarrow "The Cost, C , when 80 people attend the dinner, is \$300."

6. What is the greatest common factor of 36, 48, 60.

- A. 2
 B. 3
 C. 6
D. 12
- $\begin{matrix} 2 \overline{)36} & 2 \overline{)48} & 2 \overline{)60} \\ 2 \overline{)18} & 2 \overline{)24} & 2 \overline{)30} \\ 3 \overline{)9} & 2 \overline{)12} & 3 \overline{)15} \\ & 2 \overline{)6} & 5 \overline{)5} \\ & 3 & \end{matrix}$
- $36 = 2 \cdot 2 \cdot 3 \cdot 3$
 $48 = 2 \cdot 2 \cdot 2 \cdot 2 \cdot 3$
 $60 = 2 \cdot 2 \cdot 3 \cdot 5$
- $\therefore \text{GCF} = 2 \cdot 2 \cdot 3 = 12$
- $\uparrow \uparrow \uparrow$
 Common to all 3 numbers.

7. Write $3\sqrt{2}$ as an entire radical

- A. $\sqrt{6}$
- B. $\sqrt{12}$
- C. $\sqrt{18}$**
- D. $\sqrt{36}$

$$\begin{aligned}
 &3\sqrt{2} \\
 &= \sqrt{3 \cdot 3 \cdot 2} \\
 &= \sqrt{9 \cdot 2} \\
 &= \sqrt{18}
 \end{aligned}$$

8. Order the numbers from the smallest value to the largest value.

I	$-2\sqrt{5}$
II	$3\sqrt{2}$
III	$-5\sqrt{2}$
IV	$\sqrt{12}$

Change all numbers to entire radicals.

- A. IV, II, I, III
- B. III, I, IV, II**
- C. I, III, IV, II
- D. IV, I, II, III

$ \begin{aligned} &\text{I} \\ &-2\sqrt{5} \\ &= -\sqrt{2 \cdot 2 \cdot 5} \\ &= -\sqrt{4 \cdot 5} \\ &= -\sqrt{20} \end{aligned} $	$ \begin{aligned} &\text{II} \\ &3\sqrt{2} \\ &= \sqrt{3 \cdot 3 \cdot 2} \\ &= \sqrt{9 \cdot 2} \\ &= \sqrt{18} \end{aligned} $	$ \begin{aligned} &\text{III} \\ &-5\sqrt{2} \\ &= -\sqrt{5 \cdot 5 \cdot 2} \\ &= -\sqrt{25 \cdot 2} \\ &= -\sqrt{50} \end{aligned} $	$ \begin{aligned} &\text{IV} \\ &\sqrt{12} \end{aligned} $
---	--	--	---

ORDER: $\boxed{-\sqrt{50} \quad -\sqrt{20} \quad \sqrt{12} \quad \sqrt{18}}$
III I IV II

9. Simplify $(64a^{12}b^{15})^{\frac{2}{3}}$

- A. $16a^8b^{10}$**
- B. $16a^{18}b^{10}$
- C. $64a^8b^{10}$
- D. $16a^8b^{25}$

$$\begin{aligned}
 &= 64^{\frac{2}{3}} (a^{12})^{\frac{2}{3}} (b^{15})^{\frac{2}{3}} \\
 &= \sqrt[3]{64^2} (a^{\frac{12 \cdot 2}{3}}) (b^{\frac{15 \cdot 2}{3}}) \\
 &= 4^2 a^8 b^{10} \\
 &= 16a^8b^{10}
 \end{aligned}$$

10. Evaluate $8^{-\frac{2}{3}}$

- A. -4
- B. -27
- C. $\frac{1}{4}$**
- D. $\frac{1}{2}$

$$\begin{aligned}
 &= \left(\frac{8}{1}\right)^{-\frac{2}{3}} \\
 &= \left(\frac{1}{8}\right)^{\frac{2}{3}} \\
 &= \frac{\sqrt[3]{1^2}}{\sqrt[3]{8^2}} \rightarrow \frac{1}{2^2} \\
 &= \frac{1}{4}
 \end{aligned}$$

11. The heights of four students are listed below. Arrange them from shortest to tallest.

Student	Height
Molly	167 cm
Christie	5 feet 3 inches
Stephanie	67 inches
Jarrold	2 yards

Convert all measurements to one unit.
I pick inches.

Molly: $167 \text{ cm} \times \frac{1 \text{ inch}}{2.54 \text{ cm}} = 65.75 \text{ inches}$.

Christie: $5 \text{ feet} \times \frac{12 \text{ inches}}{1 \text{ foot}} = 60 \text{ in} \rightarrow 60 + 3 = 63 \text{ inches}$

Jarrold: $2 \text{ yards} \times \frac{36 \text{ inches}}{1 \text{ yard}} = 72 \text{ inches}$.

- A. Jarrold, Stephanie, Molly, Christie
- B. Christie, Molly, Stephanie, Jarrold**
- C. Stephanie, Christie, Molly, Jarrold
- D. Christie, Stephanie, Molly, Jarrold

Shortest to tallest: 63, 65.75, 67, 72
Christie Molly Stephanie Jarrold

12. Determine the tangent ratio for T

SOHCAHTOA

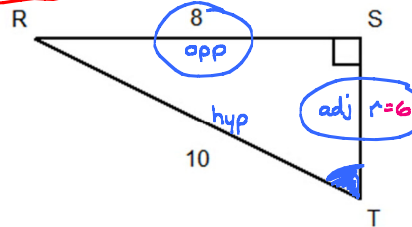
A. $\frac{3}{4}$

B. $\frac{5}{4}$

C. $\frac{4}{5}$

D. $\frac{4}{3}$

$\tan T = \frac{\text{opp}}{\text{adj}}$
 $\tan T = \frac{8}{6}$
 $= \frac{4}{3}$



Find "r"
 $a^2 + b^2 = c^2$
 $r^2 + 8^2 = 10^2$
 $r^2 = 10^2 - 8^2$
 $r^2 = 36$
 $r = 6$

This is the end of Part A (calculator not permitted).

If there is some time left, you have two options:

- i) Make sure you have answered all the questions. You will not be able to go back to this section at the end of 40 minutes.
- ii) You may proceed to the rest of the examination without the use of a calculator; there are many questions that do not require a calculator. Make sure you flag any questions you skip to remember to go back to them later.

Do not access your calculator until directed by the supervisor. At the end of the 40 minutes, the supervisor will give you permission to access your calculator.

PART B: MULTIPLE-CHOICE QUESTIONS
(calculator permitted)

Value: 42 marks

Suggested Time: 75 minutes

INSTRUCTIONS: For each question, select the best answer and record your choice on the white Answer Sheet provided. Using an HB pencil, completely fill in the bubble that has the letter corresponding to your answer.

13. A retirement home ordered canvas shopping bags for 90 residents. This graph shows the cost of the shopping bags, C dollars as a function of the number ordered, n . Suppose one more shopping bag was ordered. What would be the increase in cost?

$$\text{Slope} = \frac{\text{rise}}{\text{run}} = \frac{\text{Cost (\$)}}{\text{number of bags}}$$

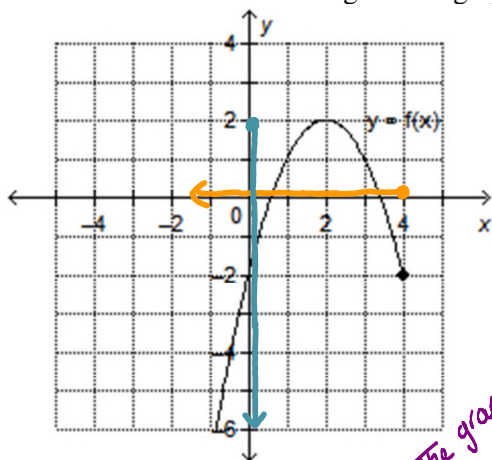
$$\therefore \text{Slope} = \frac{\$100}{25 \text{ bags}}$$

$$\text{Slope} = \frac{\$4}{1 \text{ bag}}$$



- A. \$0.25
- B. \$4.56
- C. \$5.00
- D. \$4.00**

14. Determine the domain and range of the graph of this function.



domain $x \leq 4$
range $y \leq 2$

The graph extends to the edge implying that it continues.

- A. $2 \leq x \leq 4; y \leq 2$
- B. $x \leq 4; y \leq 2$**
- C. $x \leq 2; y \leq 4$
- D. $x \leq 4; -2 \leq y \leq 2$

15. Which table of values represents a linear relation?

A.

Distance (m)	0	5	10	15	20
Time (s)	0	1	2	3	4

B.

Time (s)	0	3	6	9	12
Distance (m)	0	10	22	36	52

C.

Time (s)	0	1	2	3	4
Speed (m/s)	0	1	2	4	8

D.

Distance (m)	0	4	16	36	64
Speed (m/s)	0	2	4	6	8

In a linear relation, as x increases by a constant number then y also increases by a constant number.

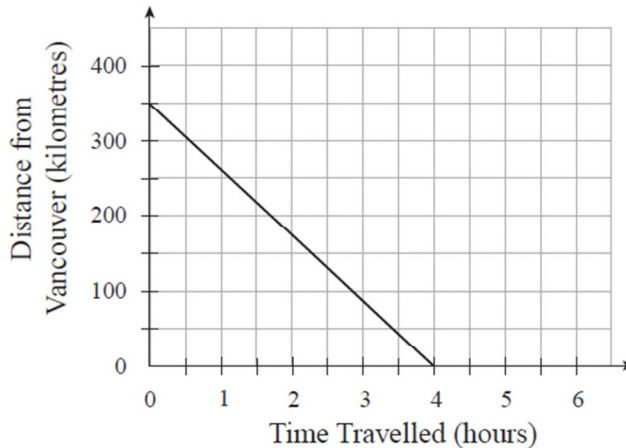
16. What does the slope represent in the graph below?

$$\text{Slope} = \frac{\text{rise}}{\text{run}}$$

$$= \frac{\text{Distance (km)}}{\text{time (h)}}$$

$$\text{Slope} = \frac{\text{km}}{\text{h}} = \text{speed}$$

- A. Distance from Vancouver
- B. Time Travelled
- C. Average Speed**
- D. Distance to Vancouver



17. A road rises 9 m for every 60 m measured horizontally. Determine the slope of the road.

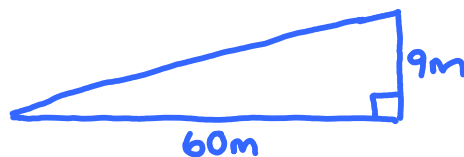
A. $-\frac{20}{3}$

C. $\frac{20}{3}$

B. $-\frac{3}{20}$

D. $\frac{3}{20}$

$$\text{Slope} = \frac{\text{rise}}{\text{run}} = \frac{9}{60} = \frac{3}{20}$$



18. The cost, C , in dollars, of holding a banquet depends on the number of people attending, n , plus a fixed hall rental cost. If the cost per person is \$7.50, $C(0) = 25$, and $C(50) = 400$, what is the equation of the cost function?

A. $C(n) = 7.50n + 400$

B. $C(n) = 50n + 400$

C. $C(n) = 7.50n + 50$

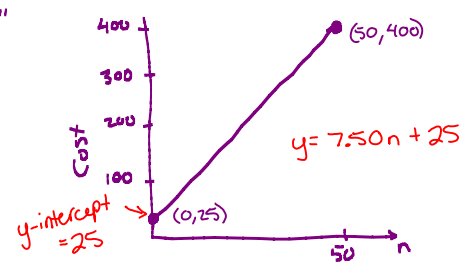
D. $C(n) = 7.50n + 25$

rate = slope = 7.50
 $C = 7.50n + b$
 means when $n=0$, $C=25$
 means when $n=50$, $C=400$

what is the y-intercept?

Method 1:
 Substitute a point in equation + solve for "b"
 $n=0, C=25$
 $C = 7.50n + b$
 $25 = 7.50(0) + b$
 $25 = b$
 $C = 7.50n + 25$

Method 2: Sketch a graph



19. For a service call, an electrician charges a \$65 flat fee, plus \$45 for every 30 min worked. Determine the rate of change of this linear relation.

A. \$45/h

B. \$110/h

C. \$65/h

D. \$90/h

Rate of change = slope = $\frac{\text{Cost (\$)}}{\text{hour}}$
 $= \frac{\$45}{\frac{1}{2} \text{ hour}}$
 $= \frac{\$90}{\text{hour}}$

20. Water is draining from a full 4620 L tank at the rate of 55 L per hour. Which of the following can be used to describe the volume, V , over time, t , in hours?

A. I and III only

B. II and III only

C. I and II only

D. I, II, and III

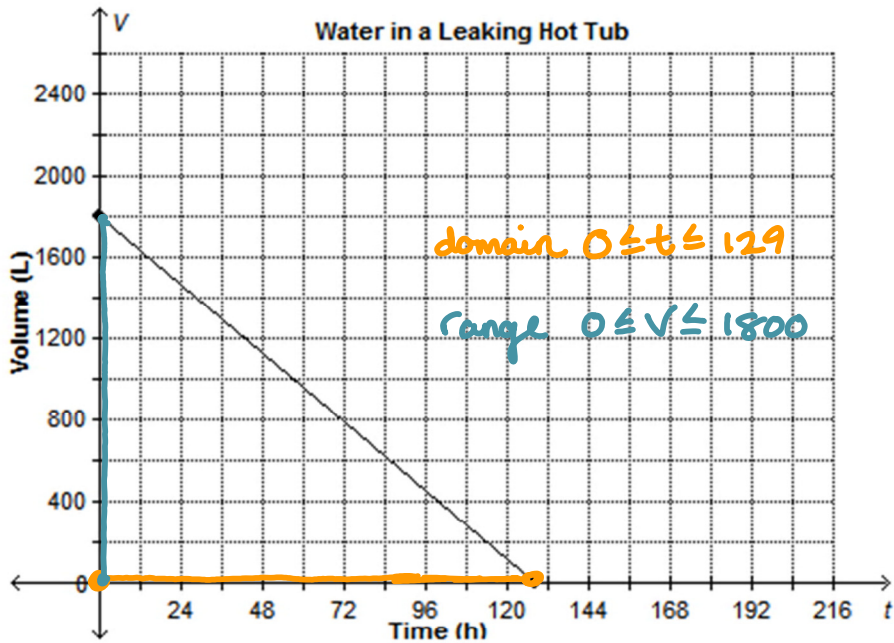
Initial volume of the tank is 4620L (y-intercept)
 rate is $\frac{55L}{h}$ (slope)
 $V = 4620 - 55t$

Find "t-intercept": (how long it takes to empty tank) $V=0$

$0 = 4620 - 55t$
 $-4620 = -55t$
 $\frac{-4620}{-55} = \frac{-55t}{-55}$
 $t = 84$

I.							
II.	<table border="1"> <thead> <tr> <th>t</th> <th>V</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>4620</td> </tr> <tr> <td>84</td> <td>0</td> </tr> </tbody> </table>	t	V	0	4620	84	0
t	V						
0	4620						
84	0						
III.	$V = 4620 - 55t$						

21. This graph shows the volume of water remaining in a leaking hot tub as a function of time. Determine the domain and range.



- A. Domain: $t \leq 129$
Range: $0 \leq V \leq 1800$
- B. Domain: $0 \leq V \leq 1800$
Range: $t \leq 129$
- C. Domain: $0 \leq t \leq 129$
Range: $V \leq 1800$
- D.** Domain: $0 \leq t \leq 129$
Range: $0 \leq V \leq 1800$

22. Which of the following describes the graph of $3x - 4y + 4 = 0$?

<input checked="" type="radio"/> I.	The y -intercept is 1.
<input checked="" type="radio"/> II.	The slope is $\frac{3}{4}$.
<input checked="" type="radio"/> III.	The domain is the set of all real numbers.

- A. I and II only
- B. I and III only
- C. II and III only
- D.** I, II and III

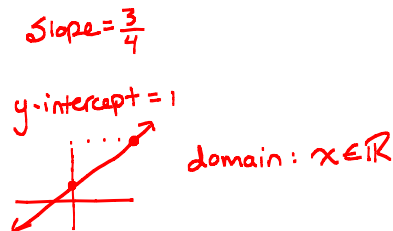
$$3x - 4y + 4 = 0$$

$$+4y \quad +4y$$

$$3x + 4 = 4y$$

$$\frac{4y}{4} = \frac{3x + 4}{4}$$

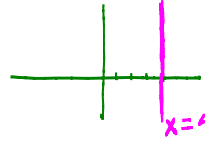
$$y = \frac{3}{4}x + 1$$



23. Which statement is true for the graph of $x - 4 = 0$?

- A. The domain is $x = 4$. ✓
- B. The slope is zero. ✗
- C. The range is $y = 4$. ✗
- D. The domain is all real numbers. ✗

$+4 +4$
 $x = 4$

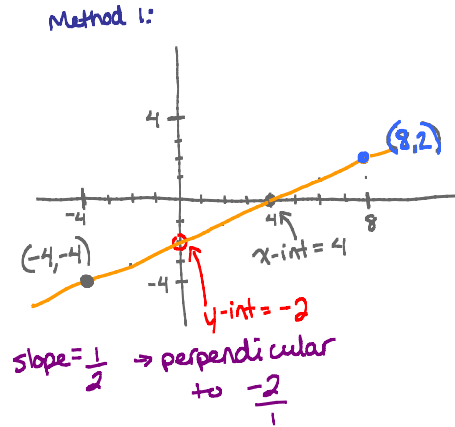


domain: $x = 4$
slope is undefined
range: $y \in \mathbb{R}$

24. A line passes through the point $(-4, -4)$ and has an x -intercept of 4. Which of the following statements are true?

I	The line has a y -intercept of -2 ✓
II	The line passes through the point $(8, 2)$ ✓
III	The line is perpendicular to $y = -2x - 2$ ✓

- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II, and III



Method 2:

Points $(-4, -4)$ and $(4, 0)$ \downarrow x -int.

slope = $\frac{-4-0}{-4-4} = \frac{-4}{-8} = \frac{1}{2}$ \perp slope = -2 ✓

$y = \frac{1}{2}x + b$ (to find "b" subs $(4, 0)$)

$0 = \frac{1}{2}(4) + b$

$0 = 2 + b$

$-2 = b \rightarrow y = \frac{1}{2}x - 2$ y -int = -2 ✓

Does it pass through $(8, 2)$?

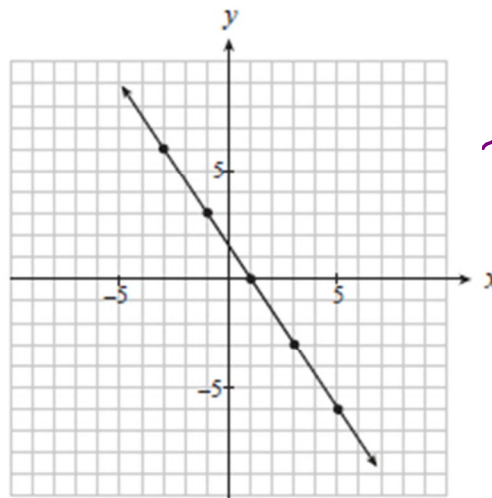
LS = 4 RS = $\frac{1}{2}x - 2$

$= 2 = \frac{1}{2}(8) - 2$

$= 4 - 2 = 2$ ✓ **yes** ✓

25. Which of the following equations represents a line that is perpendicular to the line shown below and passes through the point $(-2, -6)$?

- A. $y = \frac{2}{3}x + 2$
- B. $y = \frac{2}{3}x - \frac{14}{3}$
- C. $y = -\frac{3}{2}x - 9$
- D. $y = -\frac{2}{3}x - \frac{22}{3}$



slope = $\frac{\text{rise}}{\text{run}}$

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

Perpendicular to $\frac{2}{3}$

$y = \frac{2}{3}x + b$

Passes through $(-2, -6)$

$-6 = \frac{2}{3}(-2) + b$

$-6 = -\frac{4}{3} + b$

$-6 + \frac{4}{3} = b$

$-\frac{18}{3} + \frac{4}{3} = b$

$-\frac{14}{3} = b$

$y = \frac{2}{3}x - \frac{14}{3}$

26. Which of the following lines passes through the points (3, -1) and (10, -4)?

Method 1: x_1, y_1 x_2, y_2

$$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{-4 - (-1)}{10 - 3}$$

$$= \frac{-4 + 1}{7}$$

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

Method 2:
Substitute the coordinates of both points into each equation

A. $y = \frac{3}{7}x - \frac{16}{7}$

B. $y = \frac{3}{7}x - \frac{58}{7}$

C. $y = -\frac{3}{7}x - \frac{16}{7}$

D. $y = -\frac{3}{7}x + \frac{2}{7}$

$y = -\frac{3}{7}x + b$

subs (3, -1)

$$-1 = -\frac{3}{7}(3) + b$$

$$-1 = -\frac{9}{7} + b$$

$$-1 + \frac{9}{7} = b$$

$$\frac{-7}{7} + \frac{9}{7} = b$$

$$\frac{2}{7} = b$$

$$y = -\frac{3}{7}x + \frac{2}{7}$$

27. Determine the value of A, if the lines $y = 2x + 5$ and $Ax - 3y + 30 = 0$ intersect on the x-axis.

A. 12

B. 6

C. -6

D. -12

Find the coordinates of the x-intercept + substitute them into the other equation + solve for A.

x-intercept: $y = 0$

$$y = 2x + 5$$

$$0 = 2x + 5$$

$$-5 = 2x$$

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

$$x = -2.5$$

x-intercept (-2.5, 0)

substitute (-2.5, 0)

$$Ax - 3y + 30 = 0$$

$$A(-2.5) - 3(0) + 30 = 0$$

$$A(-2.5) + 30 = 0$$

$$-30 \quad -30$$

$$A(-2.5) = -30$$

$$\frac{A(-2.5)}{(-2.5)} = \frac{-30}{-2.5}$$

A = 12

28. Cabby Cabs charges its customers a fixed fee plus \$0.80 per kilometre travelled. If a customer were charged \$16.75 for an 18 km trip, how much would the customer pay for a 36 km trip?

A. \$28.80

B. \$31.15

C. \$33.50

D. \$45.55

Fixed fee = y-intercept

$$\frac{\$0.80}{\text{km}} = \text{rate} = \text{slope}$$

$$y = 0.80x + b$$

↑
find y-int.

Substitute $y = \$16.75$
 $x = 18$

$$16.75 = 0.80(18) + b$$

$$16.75 = 14.4 + b$$

$$16.75 - 14.4 = b$$

$$2.35 = b$$

$$y = 0.80x + 2.35$$

$x = 36 \text{ km}$

$$y = 0.80(36) + 2.35$$

y = 31.15

29. If $f(x) = 5x + 6$, determine $f(-3)$.

- A. -9
- B. $-\frac{9}{5}$
- C. 3
- D. 21

$$f(x) = 5x + 6$$

$$f(-3) = 5(-3) + 6$$

$$= -15 + 6$$

$$= -9$$

30. Which linear system has the solution $x = 4$ and $y = -2$?

A. $x + 4y = 15$
 $4x - 2y = -17$

$4 + 4(-2) = 4 - 8 = -4 \neq 15$ ✗

C. $4x + y = 14$
 $-2x + 4y = -16$

$4(4) + (-2) = 16 - 2 = 14$ ✓

$-2(4) + 4(-2) = -8 - 8 = -16$ ✓

B. $2x + 4y = 4$
 $-2x + y = 14$

$2(4) + 4(-2) = 8 - 8 = 0 \neq 4$ ✗

D. $x + 4y = 4$
 $2x + 4y = 8$

31. Determine the solution to the linear system below.

$$\begin{array}{r} x - 2y = -56 \quad \textcircled{1} \times 5 \\ 5x + 13y = 410 \quad \textcircled{2} \end{array}$$

$$5x - 10y = -280$$

$$5x + 13y = 410$$

$$-23y = -690$$

- A. (4, -30)
- B. (-4, 30)
- C. (4, 30)
- D. (-4, -30)

Subs $y = 30$

$$x - 2(30) = -56$$

$$x - 60 = -56$$

$$+60 \quad +60$$

$$x = 4$$

(4, 30)

32. Mark invested a total of \$4475 in two bonds. He invested in one bond at an annual interest rate of 8% and in another bond at an annual interest rate of 10%. After one year, the total interest earned was \$389.50. How much money did Mark invest in each bond?

- A. \$1575 at 8%
\$2900 at 10%
- B. \$2900 at 8%
\$1575 at 10%
- C. \$2075 at 8%
\$2400 at 10%
- D. \$2400 at 8%
\$2075 at 10%

Let x be amount invested at 8%
 y be amount invested at 10%

$$x + y = 4475 \rightarrow y = 4475 - x$$

$$0.08x + 0.10y = 389.50$$

$$0.08x + 0.10(4475 - x) = 389.50$$

$$0.08x + 447.5 - 0.10x = 389.50$$

$$-0.02x + 447.5 = 389.50$$

$$-447.5 \quad -447.50$$

$$-0.02x = -58$$

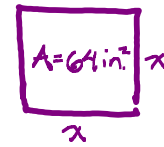
$$\frac{-0.02x}{-0.02} = \frac{-58}{-0.02} \rightarrow x = 2900$$

$x + y = 4475$
 $2900 + y = 4475$
 $y = 4475 - 2900$
 $y = 1575$

33. The area of a square is 64 square inches. What do you know about the square?

- A. Both its side length and its perimeter are irrational.
- B. Its side length is irrational and its perimeter is rational.
- C. Its side length is rational and its perimeter is irrational.
- D. Both its side length and its perimeter are rational.**

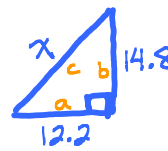
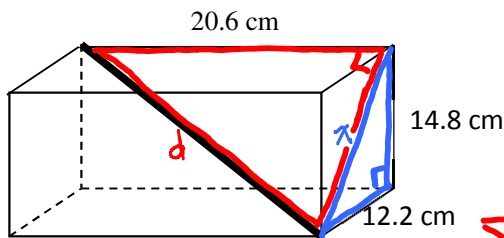
Perimeter = $4(8)$
 = 32 inches.



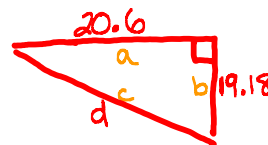
Area = $l \times w$
 $64 = x^2$
 $\sqrt{64} = x$

side length $x = 8$

34. A bar is to be placed diagonally in a box to keep the box's shape. What is the maximum length of bar that will fit, to the nearest centimeter?



$a^2 + b^2 = c^2$
 $12.2^2 + 14.8^2 = x^2$
 $367.88 = x^2$
 $x = \sqrt{367.88}$
 $x = 19.18$



$a^2 + b^2 = c^2$
 $20.6^2 + 19.18^2 = d^2$
 $792.2324 = d^2$
 $\sqrt{792.2324} = d$
 $d = 28.15 \text{ cm}^2$

- A. 28 cm²**
- B. 25 cm²
- C. 48 cm²
- D. 35 cm²

35. Simplify: $\frac{(2a^2b)^5}{(4a^2b^3)^2} = \frac{2^5 (a^2)^5 (b)^5}{4^2 (a^2)^2 (b^3)^2}$

- A. $\frac{5a^6}{4b}$
- B. $\frac{2a^6}{b}$**
- C. $\frac{2a^3}{b}$
- D. $\frac{1}{2b}$

36. Simplify: $(\sqrt[4]{x^3})(\sqrt[8]{x^{12}})$

A. $x^{\frac{9}{8}}$

B. $x^{\frac{5}{4}}$

C. x^2

D. $x^{\frac{9}{4}}$

$$= \left(x^{\frac{3}{4}}\right) \left(x^{\frac{12}{8}}\right)$$

$$= x^{\frac{3}{4} + \frac{12}{8}}$$

$$= x^{\frac{3}{4} + \frac{6}{4}}$$

$$= x^{\frac{9}{4}}$$

37. Simplify $\left(\frac{w^{-12}y^6}{-8x^3}\right)^{-\frac{1}{3}}$

A. $-\frac{w^4x}{2y^2}$

B. $-\frac{2y^2}{w^4x}$

C. $-\frac{y^2}{2w^4x}$

D. $-\frac{2w^4x}{y^2}$

$$= \left(\frac{-8x^3}{w^{-12}y^6}\right)^{\frac{1}{3}}$$

$$= \frac{(-8)^{\frac{1}{3}} (x^3)^{\frac{1}{3}}}{(w^{-12})^{\frac{1}{3}} (y^6)^{\frac{1}{3}}}$$

$$= \frac{\sqrt[3]{-8} x^{3 \times \frac{1}{3}}}{w^{-12 \times \frac{1}{3}} y^{6 \times \frac{1}{3}}}$$

$$= \frac{-2 x^1}{w^{-4} y^2}$$

$$= \frac{-2x^1}{w^{-4} y^2} = \frac{-2xw^4}{y^2}$$

$$= \frac{-2x^1}{w^{-4} y^2} = \frac{-2xw^4}{y^2}$$

$$= \frac{-2x^1}{w^{-4} y^2} = \frac{-2xw^4}{y^2}$$

$$= \frac{-2x^1}{w^{-4} y^2} = \frac{-2xw^4}{y^2}$$

38. Simplify: $\frac{(x^{a-1})^3}{(x^{2a})(x^1)}$

A. x^a

B. x^{a-2}

C. x^{a-3}

D. x^{a-4}

$$= \frac{x^{3a-3}}{x^{2a+1}}$$

$$= x^{(3a-3)-(2a+1)}$$

$$= x^{3a-3-2a-1}$$

$$= x^{a-4}$$

$$= x^{a-4}$$

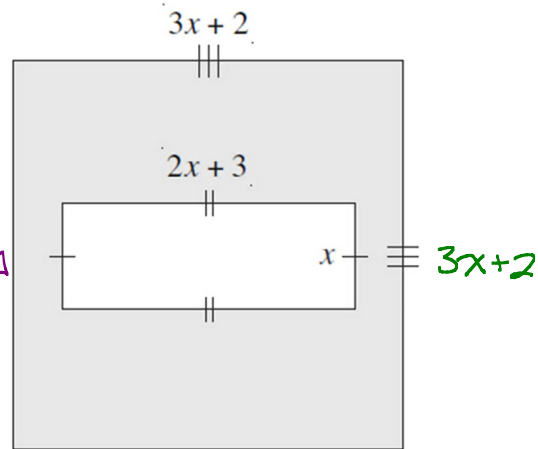
39. Expand and simplify: $(9m - 5n)^2$

- A. $81m^2 - 25n^2$
- B. $81m^2 - 45mn + 25n^2$
- C. $81m^2 - 90mn + 25n^2$**
- D. $81m^2 + 25n^2$

$$\begin{aligned}
 &(9m-5n)(9m-5n) \\
 &= 9m(9m-5n) - 5n(9m-5n) \\
 &= 81m^2 - 45mn - 45mn + 25n^2 \\
 &= 81m^2 - 90mn + 25n^2
 \end{aligned}$$

40. Determine the area of the shaded region.

- A. $7x^2 - 3x + 4$
- B. $7x^2 + 3x + 4$
- C. $7x^2 + 9x + 4$**
- D. $7x^2 + 15x + 4$



Area of large \square - Area of Small \square

$$\begin{aligned}
 &(3x+2)(3x+2) - x(2x+3) \\
 &3x(3x+2) + 2(3x+2) - 2x^2 - 3x \\
 &9x^2 + 6x + 6x + 4 - 2x^2 - 3x \\
 &= 7x^2 + 9x + 4
 \end{aligned}$$

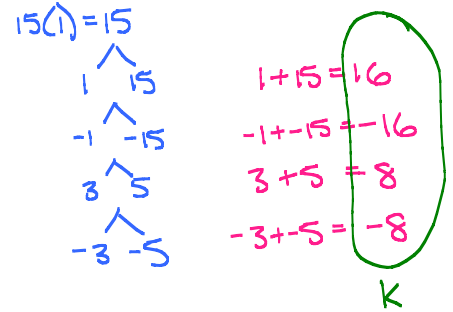
41. Factor the trinomial $20a^2b - 25ab + 45ab^2$

- A. $5ab(4a - 5 + 9b)$**
- B. $5ab(4a - 5ab + 9b)$
- C. $ab(20a - 25 + 45b)$
- D. $5(4a^2b - 5ab + 9ab^2)$

$$5ab(4a - 5 + 9b)$$

42. For which integral values of k can $15x^2 + kx + 1$ be factored?

- A. 8, 16 only
- B. $\pm 8, \pm 16$ only**
- C. $-8, -16$ only
- D. All integers between -16 and 16 , inclusive.



43. Which factor is common to both of the following polynomials?

Options:

- A. $2x - 1$**
- B. $2x + 1$
- C. $4x - 1$
- D. $4x + 1$

Polynomials:

$8x^2 - 2x - 1$
$4x^2 - 1$

Handwritten work for $8x^2 - 2x - 1$:

$$8x^2 - 2x - 1$$

$$= 8x^2 - 4x + 2x - 1$$

$$= (8x^2 - 4x) + (2x - 1)$$

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

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

Handwritten work for $4x^2 - 1$:

$$4x^2 - 1$$

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

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

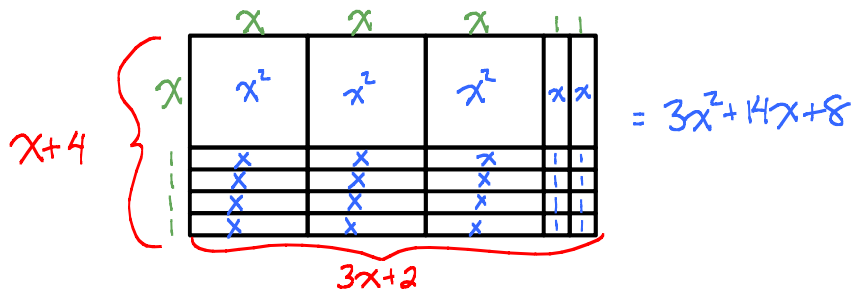
Handwritten work for the common factor:

$8(-1) = -8$

Factor pairs of -8 :

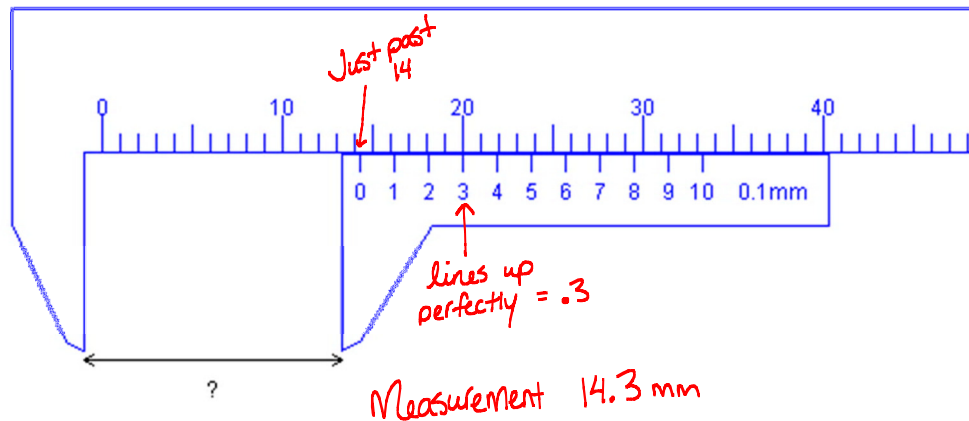
- $-4 \times 2 = -8$
- $-1 + 2 = -2$

44. Determine the multiplication sentence that the following set of algebra tiles represents.



- A. $(x^2 + 4x)(3x^2 + 2x + 8) = 3x^2 + 14x + 8$
- B. $(x^2 + 4)(3x^2 + 2) = 3x^2 + 14x + 8$
- C. $(3x + 4)(x + 2) = 3x^2 + 14x + 8$
- D. $(3x + 2)(x + 4) = 3x^2 + 14x + 8$**

45. Determine the measure of the vernier caliper below.



- A. 13.3 mm
- B. 14.3 mm
- C. 20.3 mm
- D. 10.4 mm

46. Which referent could you use for 1 yd.?

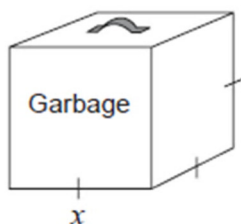
- A. The width of your shortest finger
- B. The length of a screwdriver
- C. The height of the kitchen counter above the floor
- D. The length of a football field

47. The bobsled track at the Canada Olympic Park in Calgary is 1475 m long. What is this length to the nearest yard?

$$1475 \text{ m} \times \frac{1 \text{ yd}}{0.9144 \text{ m}} = 1613 \text{ yd.}$$

- A. 1598 yd.
- B. 1613 yd.
- C. 1328 yd.
- D. 1362 yd.

48. A covered garbage bin has a surface area of 15 m^2 .



$$\begin{aligned} \text{Surface Area} &= \text{Area of Side} \times 6 \\ &= 6x^2 \\ 15 &= 6x^2 \\ \frac{15}{6} &= x^2 \\ x &= \sqrt{\frac{15}{6}} \\ x &= 1.58 \end{aligned}$$

What is the length of one side, x , of the garbage bin?

- A. 1.3 m
 B. 1.6 m
 C. 2.5 m
 D. 3.9 m

49.

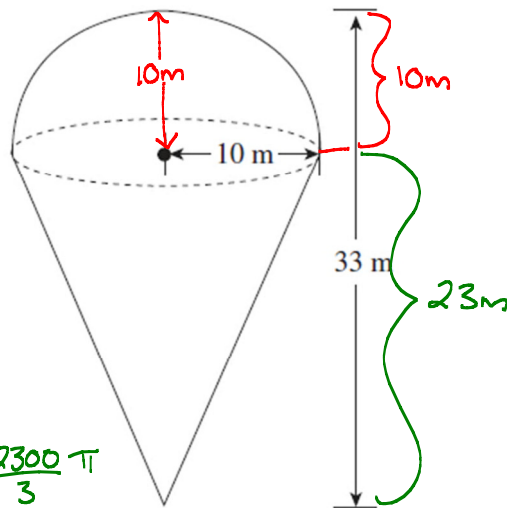
49. A weather balloon has the shape of a hemisphere on a cone as shown in the diagram below. What is the volume of this weather balloon?

- A. 4503 m^3
 B. 5550 m^3
 C. 6597 m^3
 D. 7645 m^3

$$\begin{aligned} \text{Volume of hemisphere} &= \frac{1}{2} \left(\frac{4}{3} \pi r^3 \right) \\ &= \frac{1}{2} \left(\frac{4}{3} \pi (10)^3 \right) \\ &= \frac{4}{6} \pi (1000) \\ &= \frac{2000}{3} \pi \end{aligned}$$

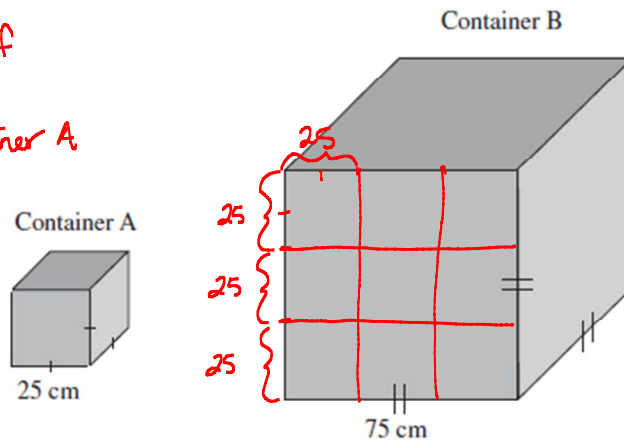
$$\begin{aligned} \text{Volume of Cone} &= \frac{1}{3} \pi r^2 h \\ &= \frac{1}{3} \pi (10)^2 (23) \\ &= \frac{2300}{3} \pi \end{aligned}$$

$$\begin{aligned} \text{Total Volume} &= \frac{2000}{3} \pi + \frac{2300}{3} \pi \\ &= 2094.395 + 2408.55 \\ &= 4502.95 \text{ m}^3 \end{aligned}$$



50 Brian created two storage containers in his woodwork class as shown in the diagram below.

Area of each side of Container B is 9 times that of container A



Compared to Container A, how much more paint does Brian need to paint Container B?

- A. 3 times
- B. 6 times
- C. 9 times
- D. 27 times

Method 2: Find Surface area of each

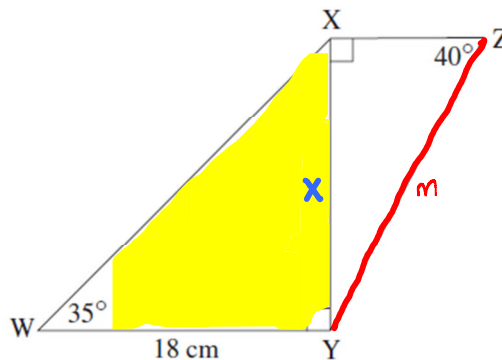
$$A: SA = 6(25)^2 = 3750$$

$$B: SA = 6(75)^2 = 33750$$

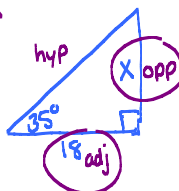
$$\frac{B}{A} = \frac{33750}{3750} = 9$$

51 Calculate the length of YZ

- A. 16.06 cm
- B. 16.45 cm
- C. 19.61 cm
- D. 22.94 cm



SOHCAHTOA

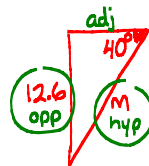


$$\tan 35^\circ = \frac{\text{opp}}{\text{adj}}$$

$$\tan 35^\circ = \frac{x}{18}$$

$$1x = 18 \tan 35^\circ$$

$$x = 12.6$$



$$\sin 40^\circ = \frac{\text{opp}}{\text{hyp}}$$

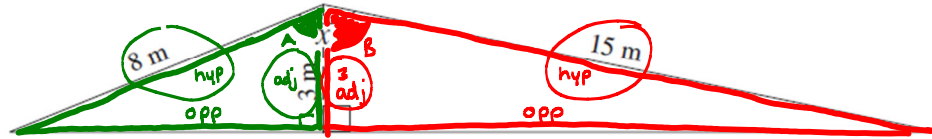
$$\sin 40^\circ = \frac{12.6}{m}$$

$$m \sin 40^\circ = 1(12.6)$$

$$\frac{m \sin 40^\circ}{\sin 40^\circ} = \frac{12.6}{\sin 40^\circ}$$

$$m = 19.6$$

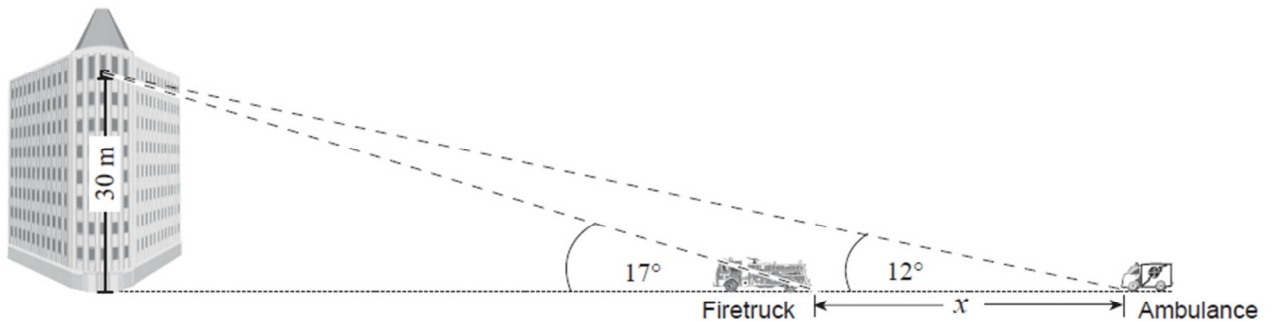
52. A roof is constructed as shown in the diagram below.



What is the angle, x , at the peak of the roof?

- A. 157°
 B. 148°
 C. 146°
 D. 136°
- $\cos A = \frac{\text{adj}}{\text{hyp}}$
 $\cos A = \frac{3}{8}$
 $\angle A = \cos^{-1}\left(\frac{3}{8}\right)$
 $\angle A = 67.98^\circ$
- $\cos B = \frac{\text{adj}}{\text{hyp}}$
 $\cos B = \frac{3}{15}$
 $\angle B = \cos^{-1}\left(\frac{3}{15}\right)$
 $\angle B = 78.46^\circ$
- $\angle x = 67.98^\circ + 78.46^\circ$
 $\angle x = 146.4$

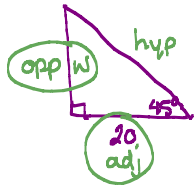
53. Cameron looks out the window 30 m above the street and sees a firetruck on the street and an ambulance behind it as shown in the diagram below.



How far apart, x , are the ambulance and firetruck?

- A. 30 m
 B. 42 m
 C. 43 m
 D. 98 m
- $\tan 17^\circ = \frac{\text{opp}}{\text{adj}}$
 $\tan 17^\circ = \frac{30}{m}$
 $m \tan 17^\circ = 1(30)$
 $m = \frac{30}{\tan 17^\circ}$
 $m = 98$
- $\tan 12^\circ = \frac{\text{opp}}{\text{adj}}$
 $\tan 12^\circ = \frac{30}{n}$
 $n \tan 12^\circ = 1(30)$
 $n = \frac{30}{\tan 12^\circ}$
 $n = 141$
- $x = 141 - 98$
 $x = 43$

54. A 10 m ladder reaches halfway up the wall of the building. Using the diagram below, what is the distance, d , from the ground to the highest point on the roof?

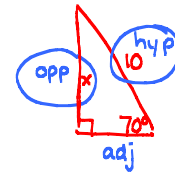
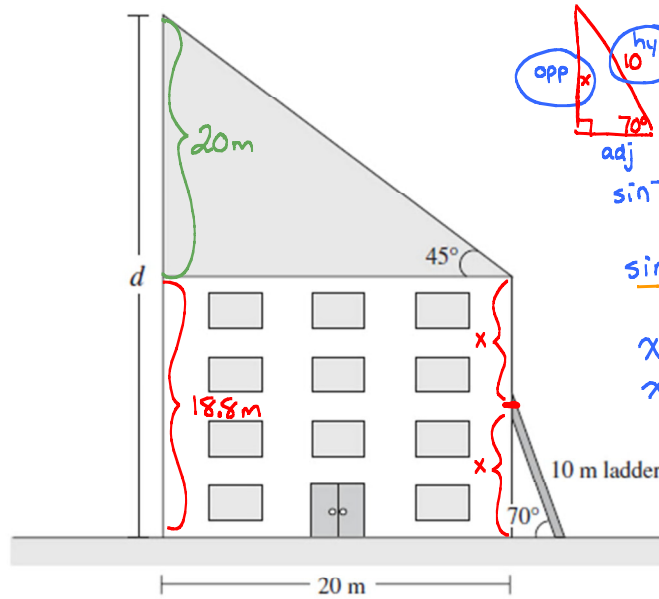


$$\tan 45^\circ = \frac{\text{opp}}{\text{adj}}$$

$$\tan 45^\circ = \frac{w}{20}$$

$$w = 20 \tan 45^\circ$$

$$w = 20$$



$$\sin 70^\circ = \frac{\text{opp}}{\text{hyp}}$$

$$\sin 70^\circ = \frac{x}{10}$$

$$x = 10 \sin 70^\circ$$

$$x = 9.4 \text{ m}$$

$$\text{wall} = 2 \times 9.4 \text{ m}$$

$$= 18.8 \text{ m}$$

- A. 40.00 m
- B. 38.79 m
- C. 37.59 m
- D. 29.40 m

$$d = 20 + 18.8$$

$$= 38.8 \text{ m}$$

PART C: NUMERICAL-RESPONSE QUESTIONS
(calculator permitted)

Value: 6 marks

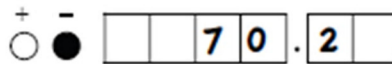
Suggested Time: 15 minutes

INSTRUCTIONS: When answering numerical-response questions on your Answer Sheet:

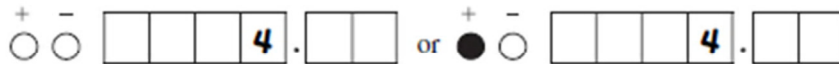
- print digits as illustrated:



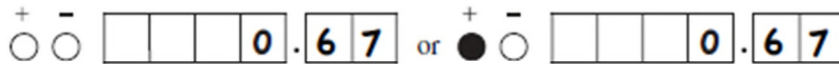
- shade the bubble with the negative symbol if the answer is negative; shade or leave blank the bubble with the positive symbol if the answer is positive.
- write your answer in the spaces provided using one digit per box, noting proper place value.
- leave unused boxes blank.
- For example, -70.2 will be written as:



- For example, 4 will be written as:

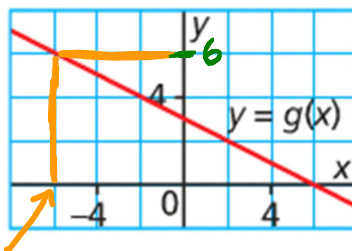


- For example, $\frac{2}{3}$, answered to two decimal places, will be written as:



55. Give the graph of $y = g(x)$ below, determine the value of x for which $g(x) = 6$.
Answer as an integer.

$y = 6$



$x = -6$

-6

Record your answer neatly on the Answer Sheet.

56. If a skateboard club holds a raffle, the profit, $P(n)$, is represented by the function $P(n) = 2n - 150$, where n is the number of tickets sold. What is the value of $P(100)$?

$$\begin{aligned}P(n) &= 2n - 150 \\P(100) &= 2(100) - 150 \\&= 200 - 150 \\&= 50\end{aligned}$$

50

Record your answer neatly on the Answer Sheet.

57. Solve the following for y :

$$\begin{array}{l}2y - 4x = -2 \\3x - 5y = 12\end{array} \rightarrow \begin{array}{l}(-4x + 2y = -2) \times 3 \rightarrow -12x + 6y = -6 \\(3x - 5y = 12) \times 4 \rightarrow 12x - 20y = 48\end{array}$$

$$\begin{aligned}-14y &= 42 \\ \frac{-14y}{-14} &= \frac{42}{-14} \\ y &= -3\end{aligned}$$

-3

Record your answer neatly on the Answer Sheet.

58. Determine the value of k that will make the following a perfect square trinomial.

Perfect Square

$$\begin{aligned} (a+b)^2 &= (a+b)(a+b) \\ &= a^2 + ab + ab + b^2 \\ &= a^2 + 2ab + b^2 \end{aligned}$$

$$\begin{aligned} 25x^2 + kxy + 9y^2 & \\ \downarrow & \\ a^2 + 2ab + b^2 & \\ \downarrow & \\ (5x)^2 + 2(5x)(3y) + (3y)^2 & \\ & \\ = 25x^2 + 30xy + 9y^2 & \end{aligned}$$

$$k = 30$$

Record your answer neatly on the Answer Sheet.

59. A line segment has endpoints $A(-7, 3)$ and $B(8, -2)$. Determine the slope of AB .

$$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1}$$

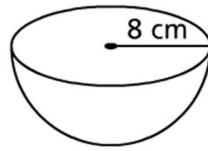
$$\text{slope} = \frac{-2 - 3}{8 - -7}$$

$$= \frac{-5}{15}$$

$$= -\frac{1}{3} = \boxed{-0.33}$$

Record your answer neatly on the Answer Sheet.

60. Calculate the surface area of the solid hemisphere below. Answer to the nearest square centimetre.



$$\begin{aligned}\text{Surface Area} &= \frac{1}{2}(\text{Area of sphere}) + \text{Area of circle} \\ &= \frac{1}{2}(4\pi r^2) + \pi r^2 \\ &= 2\pi r^2 + \pi r^2 \\ &= 3\pi r^2 \\ &= 3\pi(8)^2 \\ &= 603.1857 \quad \doteq \quad \boxed{603 \text{ cm}^2}\end{aligned}$$

Record your answer neatly on the Answer Sheet.