

Selected Response: Choose the appropriate response on the answer sheet or SCANTRON.

- A 1. If 42 bricks of length 5.5 inches each are used to enclose the perimeter of a garden, what is the perimeter of the garden to the nearest tenth of a yard?
- A. 6.4 yards
B. 7.0 yards
C. 19.3 yards
D. 21.0 yards
- $5.5 \text{ inches} \times \frac{1 \text{ yd}}{36 \text{ inches}} = \frac{5.5}{36} = 0.1528 \text{ yds}$
 $42 \times 0.1528 \approx 6.4 \text{ yards}$

- C 2. Approximately how many centimetres are in 3 yards?

- A. 42 cm
B. 43 cm
C. 270 cm
D. 280 cm

$3 \text{ yds} \times \frac{36 \text{ in}}{1 \text{ yd}} = 108 \text{ in}$
 $108 \text{ in} \times \frac{2.5 \text{ cm}}{1 \text{ in}} = 270 \text{ cm}$

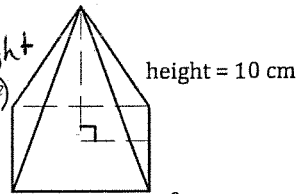
- C 3. Joyce is driving a car in the United States and sees that the speed limit is 45 miles per hour. What should Joyce's speed limit be in kilometres per hour?

- A. 18 km/h
B. 28 km/h
C. 72 km/h
D. 113 km/h

$45 \text{ miles} \times \frac{1.6 \text{ km}}{1 \text{ mile}} = 72 \text{ km/hr}$

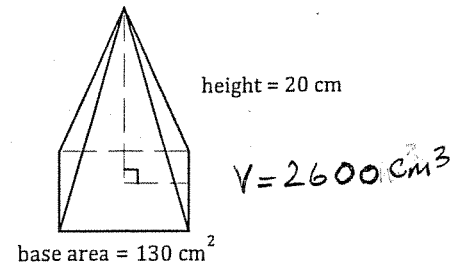
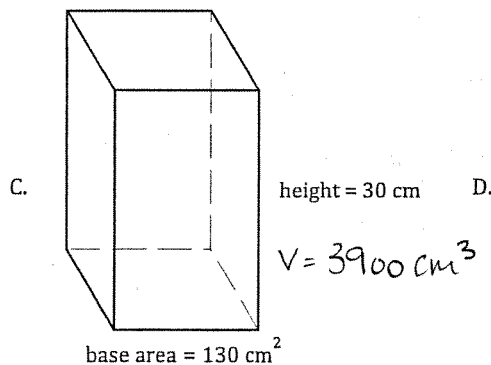
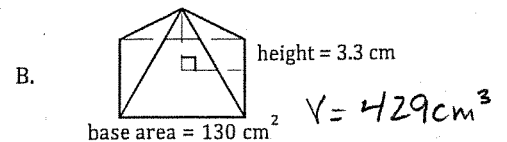
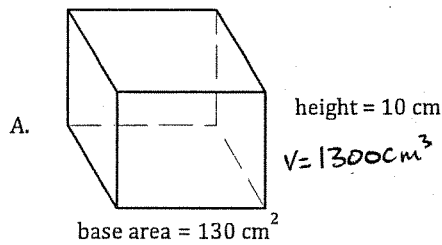
- C 4. Which shape has a volume three times larger than the given pyramid?

$V = \text{base area} \times \text{height}$
 $= (130 \text{ cm}^2) \times (10 \text{ cm})$
 $= 1300 \text{ cm}^3$



3 times larger

$3 \times 1300 = 3900 \text{ cm}^3$



- B 5. Squash balls have a radius of 20 mm.
What is the volume of the smallest cubical box that will hold the ball?

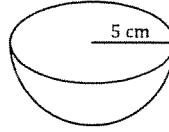
- A. 8000 mm³
B. 33 510 mm³
C. 64 000 mm³
D. 268 083 mm³

$$V = \frac{4\pi r^3}{3} = \frac{4\pi(20)^3}{3} \approx 33510.32 \text{ mm}^3$$

- C 6. What is the surface area of the hemisphere?

- A. 47 cm²
B. 157 cm²
C. 236 cm²
D. 393 cm²

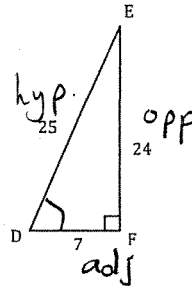
$$\begin{aligned} S.A. &= 3\pi r^2 \\ &= 3\pi(5)^2 \\ &\approx 235.62 \text{ cm}^2 \end{aligned}$$



- D 7. Which ratio represents tan D?

- A. $\frac{7}{25}$
B. $\frac{7}{24}$
C. $\frac{24}{25}$
D. $\frac{24}{7}$

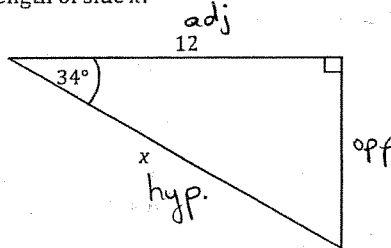
$$\begin{aligned} \tan D &= \frac{\text{opp}}{\text{adj}} \\ &= \frac{24}{7} \end{aligned}$$



- B 8. Which equation should be used to determine the length of side x?

- A. $\cos 34^\circ = \frac{x}{12}$
B. $\cos 34^\circ = \frac{12}{x}$
C. $\sin 34^\circ = \frac{x}{12}$
D. $\sin 34^\circ = \frac{12}{x}$

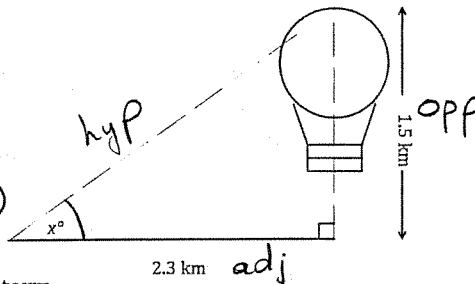
$$\begin{aligned} \cos 34^\circ &= \frac{\text{adj}}{\text{hyp}} \\ \cos 34^\circ &= \frac{12}{x} \end{aligned}$$



- A 9. What is the measure of the angle of inclination between the ground and the top of a hot air balloon?

- A. 33°
B. 41°
C. 49°
D. 57°

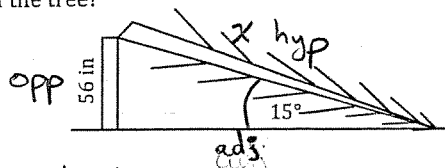
$$\begin{aligned} \tan x &= \frac{1.5}{2.3} \\ \tan x &= 0.6522 \\ \angle x &= \tan^{-1}(0.6522) \\ \angle x &\approx 33.11^\circ \end{aligned}$$



- D 10. A tree cracked and fell over during a winter storm.
If the fallen tree formed a 15° angle of inclination and the crack was 56 inches above the ground, what was the original height of the tree?

- A. 114 inches
B. 216 inches
C. 264 inches
D. 272 inches

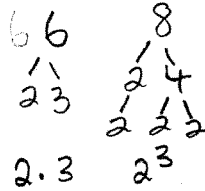
$$\begin{aligned} \sin 15^\circ &= \frac{56}{x} \\ x &= \frac{56}{\sin 15^\circ} \\ &= 216.38 \text{ in} \end{aligned}$$



$$\text{total height} = 216.38 + 56 = 272.38 \text{ in}$$

- C 11. Susan is using cereal bars and yogurt tubes for her daughter's birthday party loot bags. Cereal bars are sold in packages of 6 and yogurt tubes are sold in packages of 8. What is the minimum number of loot bags that can be made so that there are no leftovers? *Need LCM*

- A. 6
B. 8
C. 24
D. 48



Handwritten LCM calculation:

$$LCM = 2^3 \cdot 3 = 24$$

- B 12. Which pattern could be used to predict the value of 4^{-4} ?

A.

4^3	12
4^2	8
4^1	4
4^0	1
4^{-1}	$\frac{1}{4}$
4^{-2}	$\frac{1}{8}$
4^{-3}	$\frac{1}{12}$

$4^3 \neq 12$

B.

4^3	64
4^2	16
4^1	4
4^0	1
4^{-1}	$\frac{1}{4}$
4^{-2}	$\frac{1}{16}$
4^{-3}	$\frac{1}{64}$

$4^3 = 64$

$4^{-1} = \frac{1}{4}$

C.

4^3	12
4^2	8
4^1	4
4^0	1
4^{-1}	-4
4^{-2}	-8
4^{-3}	-12

$4^{-1} \neq -4$

D.

4^3	64
4^2	16
4^1	4
4^0	0
4^{-1}	-4
4^{-2}	-16
4^{-3}	-64

- C 13. Which is equivalent to $2\sqrt{5}$?

- A. $5^{\frac{1}{2}} = 2.24$
B. $10^{\frac{1}{2}} = 3.16$
C. $20^{\frac{1}{2}} = 4.47$
D. $50^{\frac{1}{2}} = 7.07$

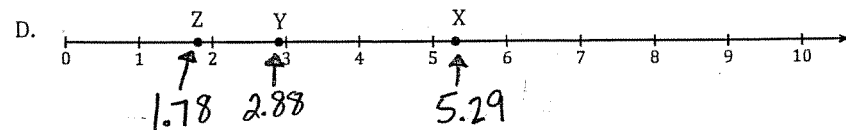
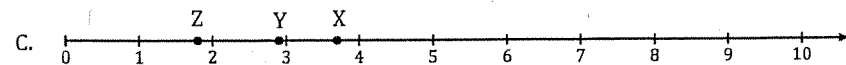
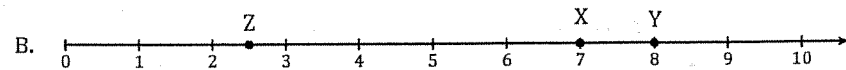
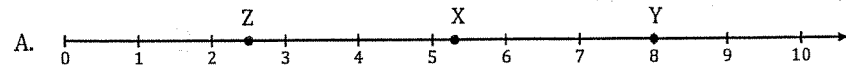
Handwritten calculation: $2 \cdot 5^{\frac{1}{2}} = 4.47$

- D 14. Which number line best represents the placement of X, Y, and Z given?

X: $2\sqrt{7} = 5.29$

Y: $24^{\frac{1}{3}} = 2.88$

Z: $\sqrt[4]{10} = 1.78$



A 15. Which is equivalent to $(-\frac{1}{8})^{-3}$?

- A. $(-8)^3$ $(-8)^3$
 B. $(-\frac{1}{8})^3$
 C. $(\frac{1}{8})^3$
 D. 8^3

B 16. Which is equivalent to $(\frac{2}{3})^4 (\frac{2}{3})^{-2}$?

- A. $(\frac{4}{9})^2$ $(\frac{2}{3})^{4-2}$
 B. $(\frac{2}{3})^2$
 C. $(\frac{2}{3})^{-8}$ $(\frac{2}{3})^2$
 D. $(\frac{4}{9})^{-8}$

A 17. Simplify: $(2x^2)^3(3x^{-3})^0$ $(2x^2)^3 (3x^{-3})^0$

- A. $8x^6$
 B. $2x^6$
 C. $8x^5$
 D. $2x^5$
- $(2)^3 (x^2)^3 (1)$
 $8x^6$

C 18. What is the GCF of $3x^2y^3 + 12x^3y^2 - 21xy^4$?

- A. 3
 B. xy^2
 C. $3xy^2$
 D. $3x^2y^2$
- $3x^2y^3 = 3 \cdot x \cdot x \cdot y \cdot y \cdot y$
 $12x^3y^2 = 3 \cdot 2 \cdot 2 \cdot x \cdot x \cdot x \cdot y \cdot y$
 $21xy^4 = 3 \cdot 7 \cdot x \cdot y \cdot y \cdot y \cdot y$
- GCF = $3 \cdot x \cdot y \cdot y$
 $= 3xy^2$

B 19. Which algebra tile model best represents the expansion of $(x + 4)(x + 3)$?

A.
Incorrect

B.
Correct

C.
Incorrect

D.
Incorrect

D 20. Which represents $(x - 6)(3x + 1)$?

A.
$$\begin{array}{r} 3x \\ +1 \\ \hline \end{array} \begin{array}{|c|c|} \hline x & -6 \\ \hline \end{array}$$

$3x^2$	$-18x$
x	6

B.
$$\begin{array}{r} 3x \\ -1 \\ \hline \end{array} \begin{array}{|c|c|} \hline x & +3 \\ \hline \end{array}$$

$3x^2$	$18x$
$-x$	6

$(x-6)(3x+1)$

$3x^2$	$-18x$
$+x$	-6

C.
$$\begin{array}{r} 3x \\ -1 \\ \hline \end{array} \begin{array}{|c|c|} \hline x & +6 \\ \hline \end{array}$$

$3x^2$	$18x$
$-x$	-6

D.
$$\begin{array}{r} 3x \\ +1 \\ \hline \end{array} \begin{array}{|c|c|} \hline x & -6 \\ \hline \end{array}$$

$3x^2$	$-18x$
x	-6

C 21. Expand and simplify: $(2x - 3)(4x + 1)$

- A. $8x^2 + 14x + 3$
- B. $8x^2 + 10x + 3$
- C. $8x^2 - 10x - 3$
- D. $8x^2 - 14x - 3$

$(2x-3)(4x+1)$
 $8x^2 + 2x - 12x - 3$
 $8x^2 - 10x - 3$

C 22. Expand and simplify: $(3x^2 - 2x - 4)(x + 5)$

- A. $3x^3 + 17x^2 + 14x + 20$
- B. $3x^3 + 13x^2 + 14x - 20$
- C. $3x^3 + 13x^2 - 14x - 20$
- D. $3x^3 - 17x^2 - 14x - 20$

$(3x^2-2x-4)(x+5)$
 $3x^3 + 15x^2 - 2x^2 - 10x - 4x - 20$
 $3x^3 + 13x^2 - 14x - 20$

B 23. Factor: $3x^2 + 14x - 5$

- A. $(3x - 1)(x - 5)$
- B. $(3x - 1)(x + 5)$
- C. $(3x + 1)(x + 5)$
- D. $(3x + 1)(x - 5)$

$3x^2 + 14x - 5$

$3x$	x
-1	$+5$

$(3x-1)(x+5)$

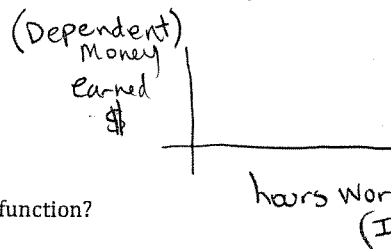
B 24. Factor: $49a^2 - 81b^2$

- A. $(7a - 9b)(7a - 9b)$
- B. $(7a - 9b)(7a + 9b)$
- C. $(9b - 7a)(9b + 7a)$
- D. $(9b - 7a)(9b - 7a)$

$49a^2 - 81b^2$
 $(7a-9b)(7a+9b)$

A 25. The number of hours a person works affects the amount of money earned. What is the dependent variable?

- A. The amount of money earned.
- B. The amount of work completed.
- C. The number of hours work.
- D. The number of people working.



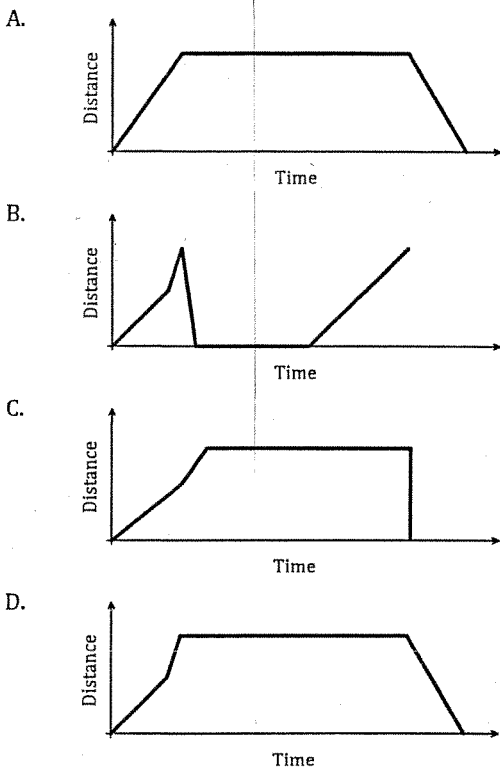
D 26. Which set of ordered pairs represents a function?

- A. $(-1, 2), (0, 2), (-1, 3), (2, 4)$
- B. $(-1, 3), (2, 3), (3, 4), (3, 5)$
- C. $(0, 0), (1, 1), (1, 2), (2, 3)$
- D. $(0, 0), (1, 2), (2, 3), (3, 4)$

x-values should all be different

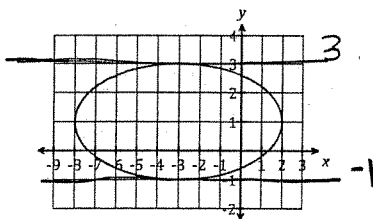
D

27. Mark is walking to a friend's house. Part way there it begins to rain and he starts to run. He stops at his friend's house for a while before returning home. Which distance-time graph best represents this situation?



D

28. What is the range of the graph below?



Range \Rightarrow y-axis.

$$\{y \mid -1 \leq y \leq 3, y \in \mathbb{R}\}$$

- A. $\{x \mid -8 \leq x \leq 2, x \in \mathbb{R}\}$
 B. $\{x \mid -1 \leq x \leq 3, x \in \mathbb{R}\}$
 C. $\{y \mid -8 \leq y \leq 2, y \in \mathbb{R}\}$
 D. $\{y \mid -1 \leq y \leq 3, y \in \mathbb{R}\}$

D

29. If $g(x) = 3x - 2$, what is the value of x when $g(x) = -14$?

- A. $x = -16$
 B. $x = -12$
 C. $x = -\frac{16}{3}$
 D. $x = -4$

$$\begin{aligned} -14 &= 3x - 2 \\ -14 + 2 &= 3x \\ -12 &= \frac{3x}{3} \\ -4 &= x \end{aligned}$$

check

$$\begin{aligned} 3(-4) - 2 &= -14 \\ -12 - 2 &= -14 \\ -14 &= -14 \\ \text{LHS} &= \text{RHS} \end{aligned}$$

D 35. What is the value of k such that the line passing through $(4, -5)$ and $(2, k)$ is parallel to the line $y = -4x + 3$? , Slope = -4 (x_1, y_1) (x_2, y_2)

- A. $k = -3$
- B. $k = -1$
- C. $k = 1$
- D. $k = 3$

$$\text{Slope} = \frac{y_2 - y_1}{x_2 - x_1}, \quad -4 = \frac{k - (-5)}{2 - 4}$$

$$-4 = \frac{k + 5}{-2}, \quad (-4)(-2) = k + 5$$

$$8 = k + 5$$

C 36. Which linear equation represents the data in the table of values?

Ⓒ $y = 3x - 5$ Ⓐ $y = -3x - 5$
 $-20 = 3(-5) - 5$ $-20 = -3(-5) - 5$
 $-20 = -15 - 5$ $-20 = 15 - 5$
 $-20 = -20$ $-20 \neq 10$

x	y
-5	-20
0	-5
5	10
10	25
15	40

\leftarrow y-int

$$8 - 5 = k$$

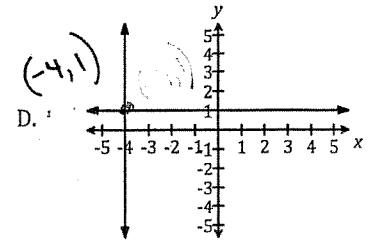
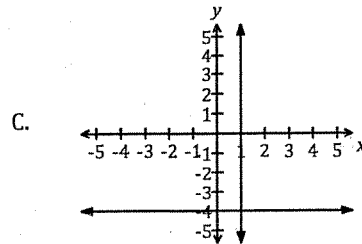
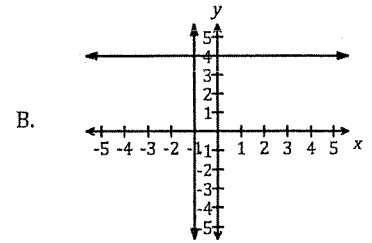
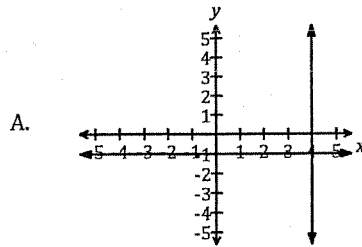
$$\boxed{3 = k}$$

- A. $y = -3x - 5$
- B. $y = -3x + 5$
- C. $y = 3x - 5$
- D. $y = 3x + 5$

use substitution

D 37. Which graph represents the solution to the system below?

$$\begin{cases} x = -4 \\ y = 1 \end{cases}$$

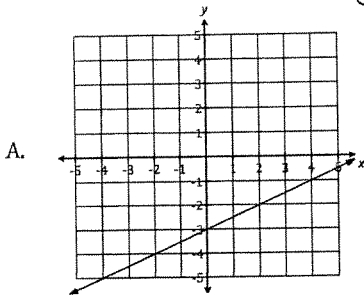


C 30. Which ordered pair represents $f(4) = -7$?

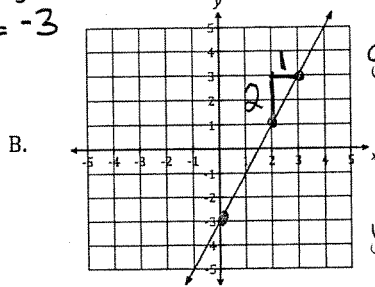
- A. $(-7, 4)$
B. $(-4, 7)$
C. $(4, -7)$
D. $(7, -4)$

$x \quad y$
 $(4, -7)$

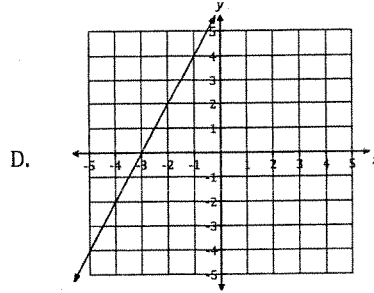
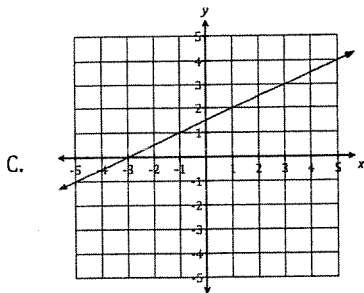
B 31. Which graph represents the equation $y = 2x - 3$?



Slope = 2
y-int = -3



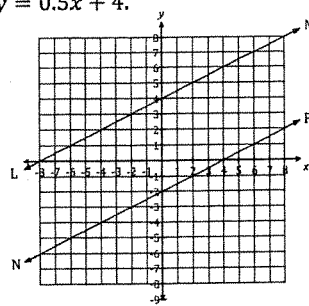
Slope = $\frac{\text{Rise}}{\text{Run}}$
 $= \frac{4}{1}$
 $= 4$
y-int = -3



A 32. In the graph below, LM is represented by the equation $y = 0.5x + 4$. If NP is parallel to LM, what is the equation of NP?

- A. $y = 0.5x - 2$
B. $y = 0.5x + 2$
C. $y = 2x - 2$
D. $y = 2x + 2$

$y = 0.5x - 2$



C 33. A line has slope $\frac{1}{2}$ and passes through point $(6, -2)$. What is the equation of the line?

- A. $-x + y + 8 = 0$
B. $-x + 2y - 4 = 0$
C. $-x + 2y + 10 = 0$
D. $x + 2y + 10 = 0$

$y = mx + b$
 $-2 = \frac{1}{2}(6) + b$
 $-2 = \frac{6}{2} + b$
 $-2 = 3 + b$
 $-2 - 3 = b$
 $-5 = b$

$y = \frac{1}{2}x - 5$
 $2(-\frac{1}{2}x + y + 5 = 0)$
 $-1x + 2y + 10 = 0$

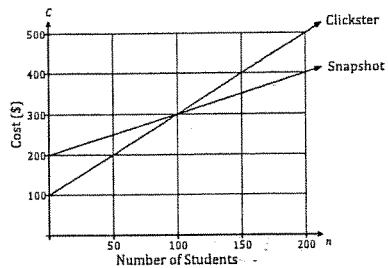
C 34. Which point is on the line $y + 5 = 3(x - 2)$?

- A. $(-2, -5)$
B. $(-2, 5)$
C. $(2, -5)$
D. $(2, 5)$

Use Substitution
 $-5 + 5 = 3(2 - 2)$
 $0 = 3(0)$
 $0 = 0$

A

38. The principal compares the cost of two photographers for student IDs. Which statement is true?



- A. *Clickster* is the better value for less than 100 students.
 B. *Clickster* is the better value for more than 150 students.
 C. *Snapshot* is the better value for less than 100 students.
 D. *Snapshot* is the better value for more than 50 students.

C

39. Linda pays \$165.50 for three concert tickets and one shirt. Glenn pays \$275.00 for four concert tickets and two shirts. Which linear system correctly models this situation?

- A. $\begin{cases} 3t + 4s = 165.50 \\ s + 2s = 275.00 \end{cases}$
 B. $\begin{cases} 3t + 4s = 275.00 \\ s + 2s = 165.50 \end{cases}$
 C. $\begin{cases} 3t + s = 165.50 \\ 4t + 2s = 275.00 \end{cases}$
 D. $\begin{cases} 3t + s = 275.00 \\ 4t + s = 165.50 \end{cases}$

B

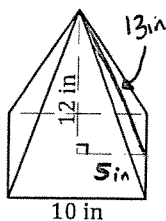
40. Which system has an infinite number of solutions?

- A. $\begin{cases} x + y = 3 \\ 2x + 3y = 4 \end{cases}$
 B. $\begin{cases} (x + y = 3) \times 2 \Rightarrow 2x + 2y = 6 \\ 2x + 2y = 6 \end{cases}$
 C. $\begin{cases} x + y = 3 \\ 2x + 2y = 8 \end{cases}$
 D. $\begin{cases} x + y = 3 \\ 2x + y = 3 \end{cases}$

Both lines have the same slope and y-intercept.
 the two lines are EXACTLY the same

Constructed Response: Calculator Permitted.
Answers to be written on this paper in the space provided. Show all workings.

41. What is the surface area of a right square based pyramid with a base length of 10 inches and a height of 12 inches (to the nearest square inch)? [3 points]



S.A base = 10×10
 $= 100 \text{ in}^2$

need slant height

$$5^2 + 12^2 = s^2$$

$$25 + 144 = s^2$$

$$169 = s^2$$

$$13 = s$$

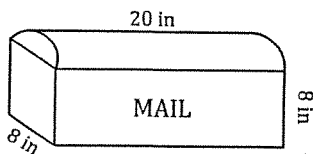
total S.A.
 $260 + 100$
 $\boxed{360 \text{ in}^2}$

S.A Lateral sides

$$SA = \frac{bh}{2} = \frac{(10)(13)}{2} = 65 \text{ in}^2$$

there are 4 triangles = $4 \times 65 = \boxed{260 \text{ in}^2}$

42. A mailbox is in the shape of a rectangular prism topped by a half-cylinder, as shown. What is the volume of the mailbox (to the nearest cubic inch)? [3 points]



$$V_{\text{PRISM}} = L \times W \times H = 20 \times 8 \times 8 = 320 \text{ in}^3$$

$$V_{\text{cylinder}} = \pi r^2 h = (\pi)(4)^2(20) = 1005.31 \text{ in}^3$$

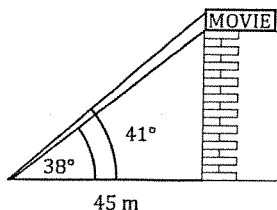
We have half a cylinder = $\frac{1005.31}{2}$

Total Volume = $320 + 502.65$

$$= 822.65 \approx \boxed{823 \text{ in}^3}$$

$$= 502.65 \text{ in}^3$$

43. From a point 45 m from the base of a movie theatre, the angle of inclination to the top of the theatre is 38° . The angle of inclination to the top of a billboard on the roof of the theatre is 41° . What is the height of the billboard (to the nearest metre)? [4 points]



$\tan 38^\circ = \frac{x}{45}$

$$45(\tan 38^\circ) = x$$

$$35.16 \text{ m} = x$$

$\tan 41^\circ = \frac{y}{45}$

$$45(\tan 41^\circ) = y$$

$$39.12 = y$$

height of Billboard

$$y - x$$

$$39.12 - 35.16$$

$$= 3.96 \text{ m}$$

$$\approx \boxed{4 \text{ M}}$$

44. Express $\sqrt[4]{1620}$ as a mixed radical in simplest form. [3 points]

$$\sqrt[4]{1620}$$

$$\sqrt[4]{10 \cdot 162}$$

$$\sqrt[4]{2 \cdot 5 \cdot 6 \cdot 27}$$

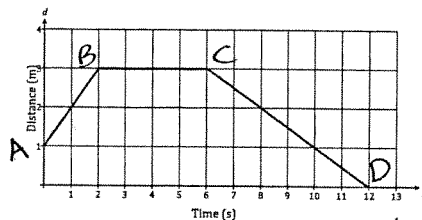
$$\sqrt[4]{2 \cdot 5 \cdot 2 \cdot 3 \cdot 3 \cdot 3 \cdot 3}$$

$$\sqrt[4]{2 \cdot 2 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 5}$$

$$3 \sqrt[4]{2 \cdot 2 \cdot 5}$$

$$3 \sqrt[4]{20}$$

48. A person moves in front of a motion sensor to produce the distance-time graph shown. Accurately describe the movements, including references to speed and direction. [3 points]



From A-B → person moves at a constant speed away from sensor
 B-C → person stops
 C-D → person again moves at a constant speed towards sensor

49. A boat travelling at 8 m/s begins to accelerate. Its new speed, S , in metres per second, is modelled by the function $S(t) = 8 + 1.5t$, where t is the length of time, in seconds, that it accelerates. [3 points]

a) Determine the speed of the boat at 7 seconds. $t=7$

$$S(7) = 8 + 1.5(7)$$

$$S(7) = 18.5 \quad \text{Speed} = 18.5 \text{ m/s}$$

b) Determine the time it takes for the boat to reach 26 m/s. $S(t) = 26$

$$26 = 8 + 1.5t$$

$$26 - 8 = 1.5t$$

$$18 = 1.5t$$

$$\frac{18}{1.5} = t$$

$$12 = t$$

It will take 3 seconds

c) What is the domain of this function?

$$\{t \mid 0 \leq t, t \in \mathbb{R}\}$$

50. Determine the equation of the line passing through $(8, -1)$ and $(4, 1)$ in general form. [3 points]

$$\text{Slope} = \frac{1 - (-1)}{4 - 8}$$

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

$$= \frac{2}{-4}$$

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

Y-intercept
use $(4, 1)$

$$y = mx + b$$

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

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

$$1 = -2 + b$$

$$1 + 2 = b$$

$$\boxed{3 = b}$$

x_1, y_1, x_2, y_2

General Form

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

$$2\left(\frac{1}{2}x + y - 3 = 0\right)$$

$$\boxed{x + 2y - 6 = 0}$$

45. Jennifer did not receive full marks for her solution below. Identify her errors and provide a correct solution.

[4 points]

$$\frac{(p^{-3}q^2)^{-4}}{(2p^2q^{-3})^3}$$

$$\boxed{\frac{p^{12}q^{-8}}{2p^6q^{-9}}}$$
 Should have been $2^3 = 8$

$$\boxed{\frac{p^{12-6}q^{-8-9}}{2}}$$
 Should have subtracted -9

$$= \frac{p^6q^{-17}}{2}$$

$$= \frac{p^6}{2q^{17}}$$

$$\begin{aligned} \frac{(p^{-3}q^2)^{-4}}{(2p^2q^{-3})^3} &= \frac{p^{12}q^{-8}}{2^3p^6q^{-9}} \\ &= \frac{p^{12}q^{-8}}{8p^6q^{-9}} \\ &= \frac{p^{12-6}q^{-8-(-9)}}{8} \\ &= \frac{p^6q^1}{8} \end{aligned}$$

46. Factor completely:

[3 points]

$$6x^2 + 27x + 12$$

$$3(2x^2 + 9x + 4)$$

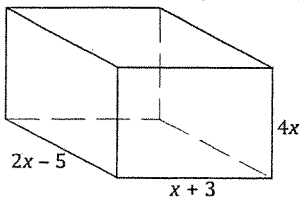
Sum	Product
+9	8
8+1	8x1

$$\boxed{3(2x+1)(x+4)}$$

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

47. Shane determines the expression for the volume of this right rectangular prism to be $4x^3 + 4x^2 - 60x$. Algebraically determine if Shane is correct.

[4 points]



$$4x(x+3) = 4x^2 + 12x$$

	$4x^2$	$+12x$
$2x$	$8x^3$	$+24x^2$
-5	$-20x^2$	$-60x$

$$V = (4x)(x+3)(2x-5)$$

$$= (4x^2 + 12x)(2x-5)$$

$$= 8x^3 + 24x^2 - 20x^2 - 60x$$

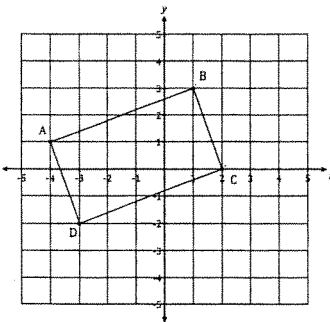
$$= 8x^3 + 4x^2 - 60x$$

Shane is incorrect.

51. Is quadrilateral ABCD a parallelogram? Justify your answer.

[3 points]

- A(-4,1)
- B(1,3)
- C(2,0)
- D(-3,-2)



Need Slope

$$\text{Slope } AB = \frac{3-1}{1-(-4)} = \frac{2}{5} = \boxed{\frac{2}{5}}$$

$$\text{Slope } BC = \frac{0-3}{2-1} = \frac{-3}{1} = \boxed{-3}$$

$$\text{Slope } CD = \frac{-2-0}{-3-2} = \frac{-2}{-5} = \boxed{\frac{2}{5}}$$

$$\text{Slope } AD = \frac{-2-1}{-3-(-4)} = \frac{-3}{1} = \boxed{-3}$$

Line $\overline{AB} \parallel \overline{CD} \Rightarrow$ SAME Slope

Line $\overline{BC} \parallel \overline{AD} \Rightarrow$ Same Slope

\therefore QUAD ABCD is a parallelogram because there are two pairs of parallel lines (opposite sides)

52. Algebraically solve the linear system.

[4 points]

ELIMINATION

$$\begin{cases} 3x + \frac{1}{2}y = 12 \\ -2x + y = 8 \end{cases}$$

$2 \times (3x + \frac{1}{2}y = 12)$ Multiply by 2 to get rid of fraction
 $-1 \times \begin{cases} 6x + y = 24 \\ -2x + y = 8 \end{cases} \Rightarrow$ multiply by -1 and the "y" terms will cancel

$$\begin{array}{r} -6x - y = -24 \\ -2x + y = 8 \\ \hline -8x = -16 \\ \frac{-8}{-8} \quad \frac{-16}{-8} \\ \hline \end{array}$$

$$\boxed{x=2}$$

Substitute $x=2$ into any equation and solve for y.

$$\begin{aligned} 6x + y &= 24, x=2 \\ 6(2) + y &= 24 \\ 12 + y &= 24, y = 24 - 12 \\ &= 12 \end{aligned}$$

Solution (2, 12)

You can verify to check your solution by choosing another equation.

$$\begin{aligned} -2x + y &= 8 \quad (2, 12) \\ -2(2) + 12 &= 8 \\ -4 + 12 &= 8 \\ 8 &= 8 \end{aligned}$$

$-8 = -8$
LHS = RHS, solution is correct.