

# Scoring Norms

- Do not write or place any marks in the student examination booklet.
- Strict adherence to the scoring guide is necessary unless a valid alternate method is used. In such cases, use your professional judgement in determining how the points will be awarded.
- Deduct 0.5 point for each:
  - computational error;
  - transcriptional error;
  - rounding error (including not rounding to the specified precision).

*Only up to a maximum of half of the value of the question.*

For example, if a question is worth 2 points, do not deduct more than 1 point for such errors.

- Deduct only once if the same error is repeated within a question. Note that for the purposes of this examination multi-part questions, for example 47(a) and 47(b), are considered two separate questions.
- Where indicated in this guide, deduct 0.5 pt if final answer does not include the correct units.
- If a student makes an error in part (a) and uses this value in part (b), award full value for a correct part (b) based on the error in part (a).

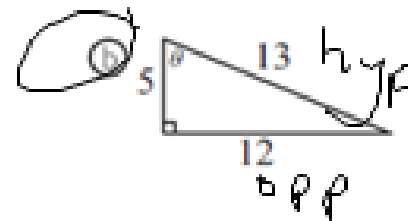
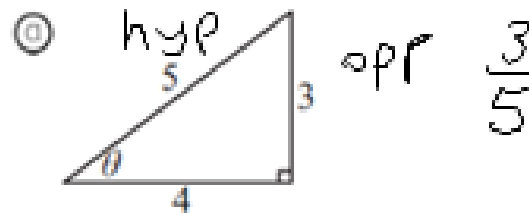
Nova Scotia Examinations

---

# Mathematics 10

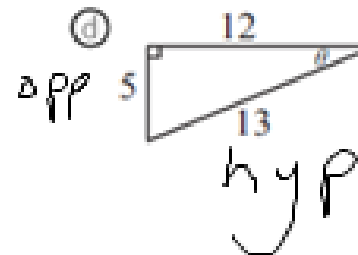
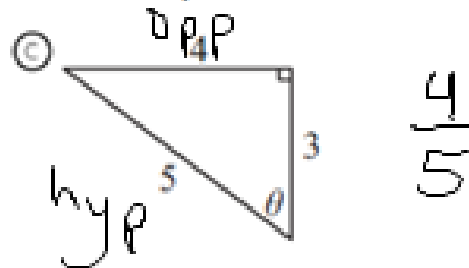
QUESTION SAMPLER

1. In which triangle is the value of  $\sin \theta$  the greatest?



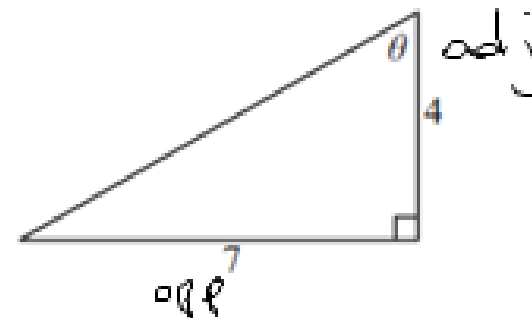
$\sin \theta = \frac{\text{opp}}{\text{hyp}}$

$\frac{12}{13}$



$\frac{5}{13}$

2. Which trigonometric expression could be used to determine the measure of angle  $\theta$ ?



$\tan \theta = \frac{7}{4}$

$\theta = \tan^{-1}\left(\frac{7}{4}\right)$

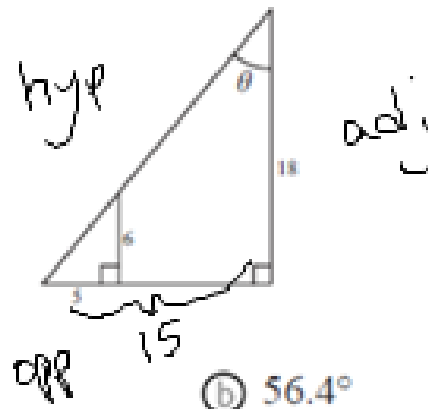
(a)  $\sin^{-1}\left(\frac{4}{7}\right)$

(b)  $\tan^{-1}\left(\frac{4}{7}\right)$

(c)  $\cos^{-1}\left(\frac{4}{7}\right)$

(d)  $\tan^{-1}\left(\frac{7}{4}\right)$

3. Determine the value of  $\theta$ .



$$\tan \theta = \frac{15}{18}$$

$$\theta = \tan^{-1}\left(\frac{15}{18}\right)$$

- a)  $89.8^\circ$
- c)  $50.2^\circ$

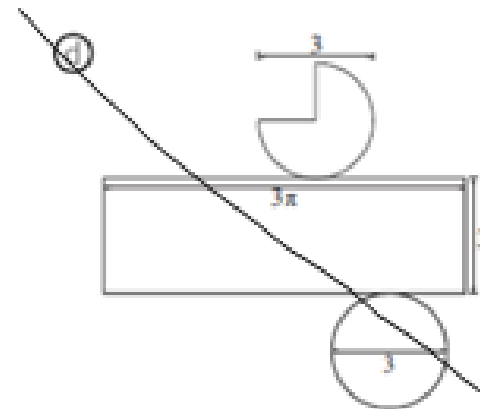
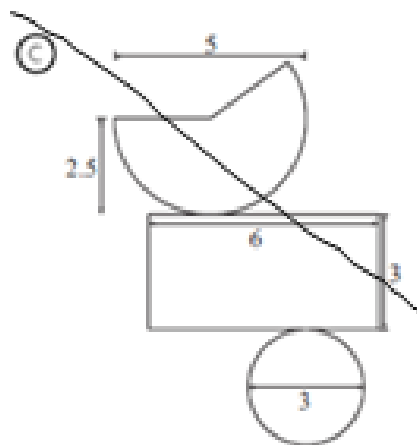
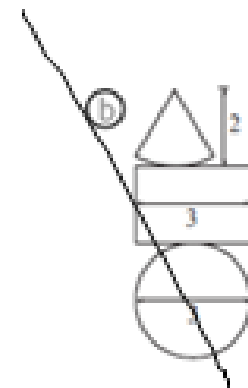
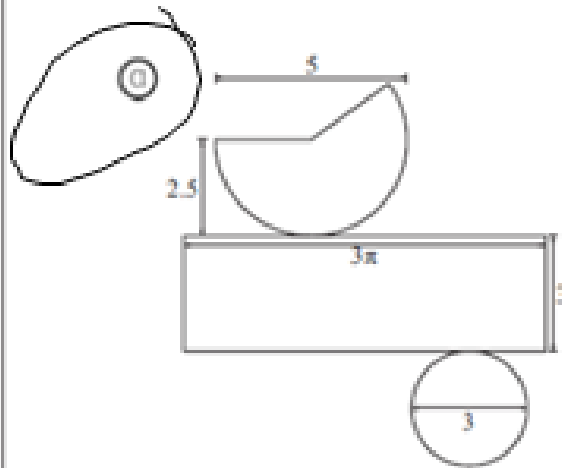
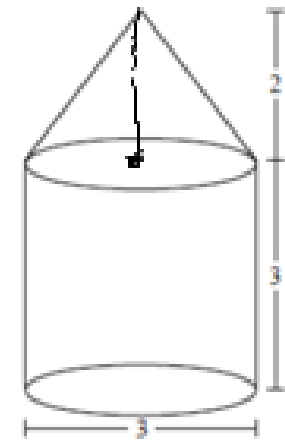
- b)  $56.4^\circ$
- d)  $33.6^\circ$

4. Which of the following diagrams could be used to find the surface area of the composite object shown?

$$a^2 + b^2 = c^2$$

$$2^2 + 1.5^2 = c^2$$

$$2.5 = c$$



5. Which of the following measurements is the longest?

120 cm, 40 inches, 1 metre, 1 yard

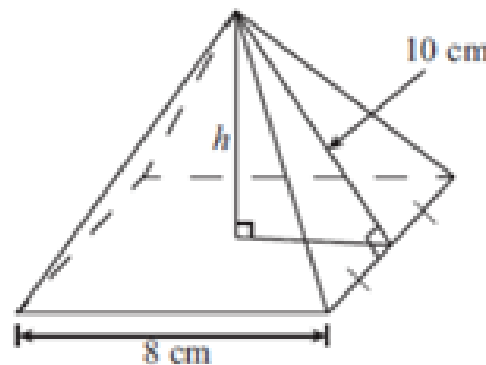
- 120 cm
- 1 metre

- 40 inches
- 1 yard

$$120 \text{ cm} \cdot \frac{1 \text{ in}}{2.54 \text{ cm}} = 47.24 \text{ in}$$

$$1 \text{ yd} \cdot \frac{3 \text{ ft}}{1 \text{ yd}} \cdot \frac{12 \text{ in}}{1 \text{ ft}} = 36 \text{ in}$$

6. Which equation below can be used to find the height of the right square pyramid shown?



$$c^2 - a^2 = b^2$$

$$\sqrt{c^2 - a^2} = b$$

$$\sqrt{10^2 - 4^2} = b$$

- $h = \sqrt{10^2 - 8^2}$
- $h = \sqrt{10^2 + 8^2}$

- $h = \sqrt{10^2 - 4^2}$
- $h = \sqrt{10^2 + 4^2}$

7. Alanna is pulled over for driving 60 mph in a 60 km/h zone. How fast was she driving in km/h?

- a) 90 km/h
- c) 100 km/h

- b) 96.5 km/h
- d) 103.5 km/h

$$60 \text{ mi} \cdot \frac{1.609 \text{ km}}{1 \text{ mi}} = 96.54$$

8. Which of the following is the best estimate of the height of a standard motorcycle?

- a) 25 cm
- c) 1 ft.

- b) 1 m
- d) 0.5 km





9. Hot dog buns come in packages of 8 and hot dogs come in packages of 12. To obtain an equal number of both hot dogs and buns, what is the least number of packages needed?

- (a) 3 packages of buns  
2 packages of hotdogs
- (b) 8 packages of buns  
12 packages of hotdogs
- (c) 2 packages of buns  
3 packages of hotdogs
- (d) 12 packages of buns  
8 packages of hotdogs

10. Which of the following sets of numbers have a greatest common factor (GCF) of 7?

- (a) {1, 7, 49}
- (b) {14, 70, 105}
- (c) {35, 54, 700}
- (d) {28, 56, 140}

11. What is the simplest form of  $3\sqrt{48}$ ?

- (a)  $12\sqrt{3}$
- (b)  $7\sqrt{3}$

$$\begin{aligned} 3\sqrt{2 \cdot 2^4} &= 3\sqrt{2 \cdot 4 \cdot 4} \\ &= 3\sqrt{2 \cdot 2 \cdot 2 \cdot 2 \cdot 3} \\ &= 3 \cdot 2 \cdot 2 \sqrt{3} \end{aligned}$$

- (c)  $6\sqrt{12}$
- (d)  $5\sqrt{12}$

12. Which of the following numbers is **NOT** irrational?

a  $\frac{\sqrt{6}}{2}$

c  $\pi$

b  $\sqrt{5}$

d  $\sqrt[3]{343}$

$\rightarrow 343 \boxed{1} (1 \div 3)$

13. What is the simplest form of  $(\sqrt{n})(n^{\frac{3}{2}})$ ?

a  $n^2$

c  $n^2$

$(n^{1/2})(n^{3/2})$

b  $n^{\frac{3}{2}}$

d  $2n^2$

$= n^{4/2}$

14. Given  $x > 1$ , which of the following is greatest?

Handwritten notes above the question:

- $x^{1/3}$  (crossed out)
- $x^{3/2}$
- $x^{-3/4}$  (crossed out)
- $x^{5/3}$
- $\sqrt[3]{x}$
- $(\sqrt{x})^7$  (circled)
- $x^{3/4}$
- $\sqrt[3]{x^5}$

(A)  $\sqrt[3]{x}$

(C)  $x^{-3/4}$

(B)  $(\sqrt{x})^7$  (circled)

(D)  $\sqrt[3]{x^5}$

15. The area of a rectangle is  $2x^2 - 5x - 3$ . If the length of one side is  $x - 3$ , what is the length of the other side?

(A)  $x + 1$  (crossed out)

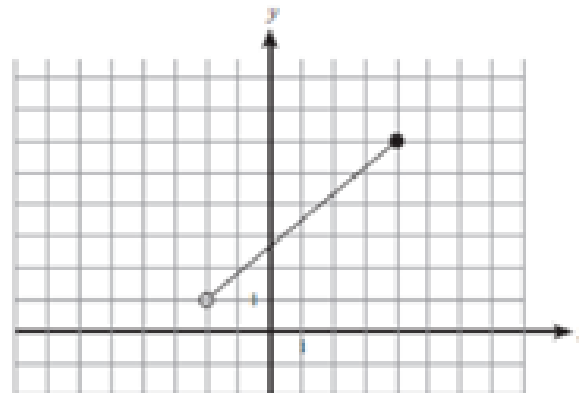
(C)  $x - 2$  (crossed out)

Handwritten factorization:  $(x - 3)(2x + 1)$

(B)  $2x + 1$  (circled)  $(x - 3)$

(D)  $2x - 3$

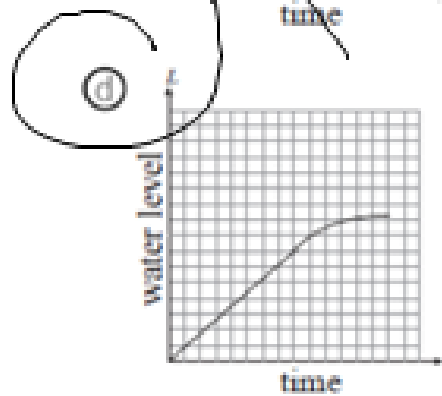
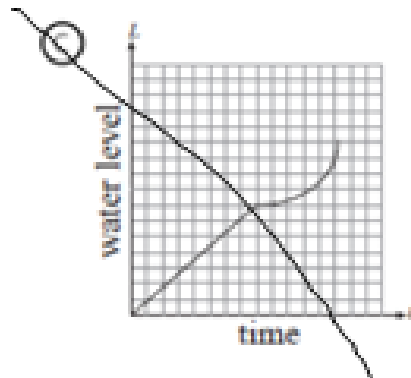
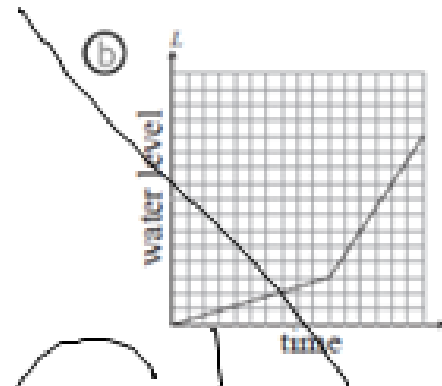
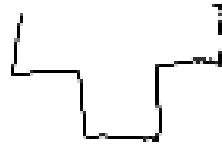
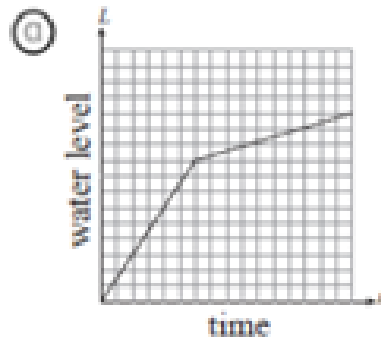
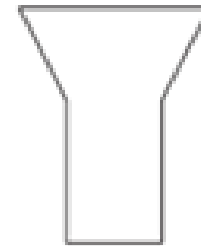
16. What is the domain for the following graph?



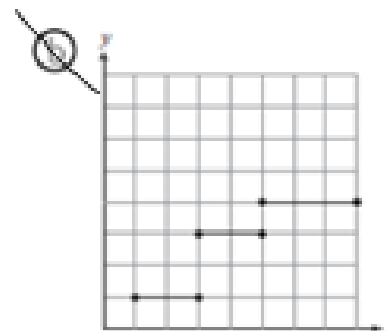
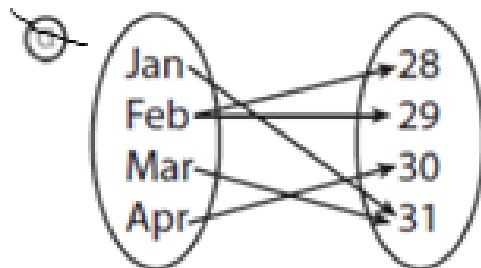
- $(-2, 4]$
- $(1, 6]$

- $[-2, 4)$
- $[1, 6)$

17. The container shown is being filled at a constant rate.  
Which of the following graphs illustrates water level over time?



18. Which of the following relations is a function?



- (0, 3)
- (1, 4)
- (2, 3)
- (3, 1)

- (NS, Sydney)
- (NB, St. John)
- (PEI, Summerside)
- (NS, Digby)

19. What is the  $x$ -intercept of the graph represented by  $3y - 4x + 12 = 0$ ?

- (3, 0)
- (-3, 0)

- (0, 4)
- (0, -4)

$$\begin{aligned} &\rightarrow y = 0 \\ 3(0) - 4x + 12 &= 0 \\ -4x &= -12 \\ \frac{-4x}{-4} &= \frac{-12}{-4} \end{aligned}$$

$$x = 3$$

20. Examine the table below.

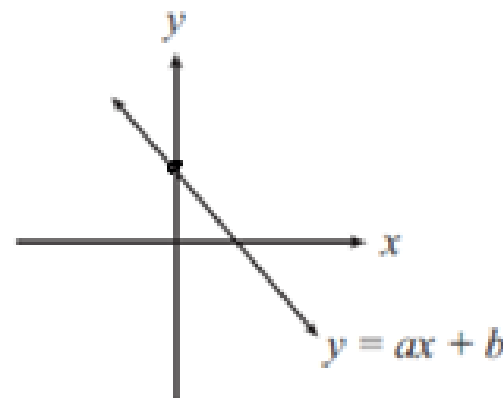
| $x$ | $y$ |
|-----|-----|
| 1   | 6   |
| 2   | 8   |
| 3   | 10  |
| 5   | 12  |

Handwritten annotations: A vertical line on the left of the table with arrows pointing to the x-values 1, 2, 3, and 5. The number '1' is written next to the first arrow, and '2' is written next to the other three arrows. On the right side of the table, arrows point to the y-values 6, 8, 10, and 12, with the number '2' written next to each arrow.

Which of the following statements is true?

- a The table of values represents a linear function since there is a common difference of 2.
- b The table of values represents a linear function since plotting the points would produce a straight line.
- c The table of values does not represent a linear function since the change in  $x$  is not constant.
- d The table of values does not represent a linear function because the change in  $y$  divided by the change in  $x$  is not constant.

21. Given  $y = ax + b$ , which of the following values are possible for  $a$  and  $b$  for the graphed line?



- a  $a = 3$  and  $b = 2$   
 c  $a = 3$  and  $b = -2$

- b  $a = -3$  and  $b = 2$   
 d  $a = -3$  and  $b = -2$

22. Which equation represents the line which passes through  $(2, 10)$  and has a slope of 3?

- a  $y - 10 = 3(x - 2)$   
 c  $y + 10 = 3(x + 2)$

- b  $y - 2 = 3(x - 10)$   
 d  $y + 2 = 3(x + 10)$



23. When a cartesian grid is laid over a map, two towns are located at the points (30, 42) and (50, 64). Where would the point midway between these towns be located?

- (a) (20, 22)
- (c) (80, 106)

- (b) (40, 53)
- (d)  $(\sqrt{80}, \sqrt{106})$

$$M = \left( \frac{x + x_1}{2}, \frac{y + y_1}{2} \right)$$
$$= \left( \frac{30 + 50}{2}, \frac{42 + 64}{2} \right)$$
$$= (40, 53)$$

24. If  $g(x) = 4 - 3x^2$ , then  $g(-2) = \underline{\hspace{2cm}}$ ?

- (a) -32
- (c) 16

- (b) -8
- (d) 40

$$g(-2) = 4 - 3(-2)^2$$
$$= -8$$

25. You purchased a new pair of sneakers for \$92.00. The original price was \$135.00. What was the percentage decrease in price?

- (a) 43%
- (c) 32%

- (b) 47%
- (d) 68%

$$\frac{135 - 92}{135} \cdot 100$$

26. At "Frosty Treats" these are the prices for milkshakes:

Unit \$/unit

Small (16 oz)..... \$3<sup>00</sup>

\$3 / 16 oz

Medium (21 oz)..... \$3<sup>75</sup>

\$3.75 / 21 oz

Large (28 oz)..... \$5<sup>10</sup>

\$5.10 / 28 oz

What size offers the best value?

(a) 16 oz

(b) 21 oz

(c) 28 oz

(d) They all have the same value.

27. Darren gets a summer job planting trees. He is paid 10¢ for each tree that he plants. What method of earning income best describes how Darren is paid?

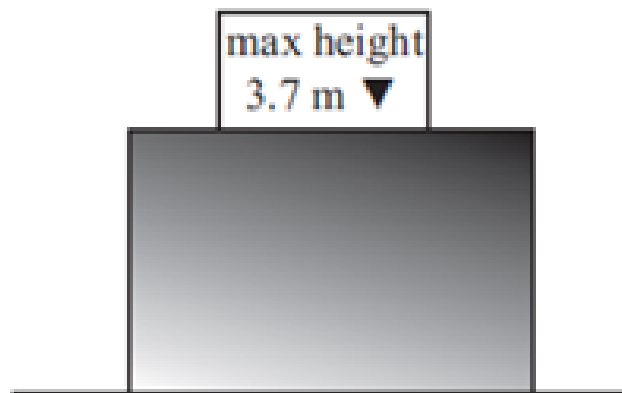
- a wages
- c piecework
- b salary
- d commission

28. Who earns the largest yearly salary?

~~Ian~~ \$850 biweekly • 26  
~~Curt~~ \$1700 monthly • 12  
Terry \$11.15 per hour, 40 hours a week (11.15)(40)(52)  
Joe \$22500 yearly

- a Ian
- c Terry
- b Curt
- d Joe

29. According to the information in the diagrams below, can the truck fit through the tunnel? Support your answer with calculations.



*Truck*

$$12 \text{ ft} \cdot \frac{30.48 \text{ cm}}{1 \text{ ft}} = 365.76 \text{ cm}$$

$$9 \text{ in} \cdot \frac{2.54 \text{ cm}}{1 \text{ in}} = 22.86$$

$$365.76 + 22.86 = 388.62 \text{ cm}$$

*tunnel*

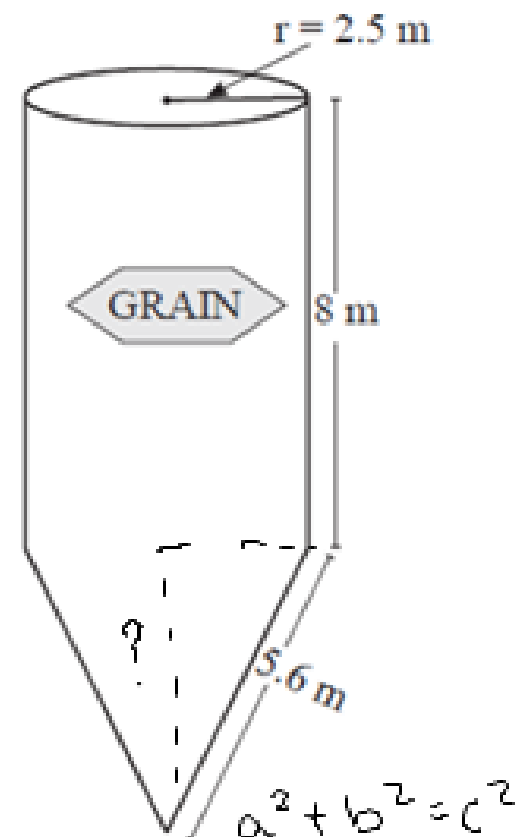
$$3.7 \text{ m} = \frac{100 \text{ cm}}{1 \text{ m}} = 370 \text{ cm}$$

No truck is too tall

30. The grain silo shown is full of wheat. An opening at the bottom allows wheat to flow out.

The rail cars used to transport grain measure 3.1 m x 4.0 m x 2.1 m.

How many rail cars are needed to empty the silo?



$$V = \overset{\text{Cyl}}{\pi r^2 h} + \overset{\text{cone}}{\frac{1}{3} \pi r^2 h}$$

$$V = \pi (2.5)^2 (8) + \frac{1}{3} \pi (2.5)^2 (5.0110)$$

$$= 189.8766 \text{ m}^3$$

Rail car

$$V = l \cdot w \cdot h$$

$$= (3.1)(4.0)(2.1)$$

$$= 26.04 \text{ m}^3$$

$$a^2 + b^2 = c^2$$

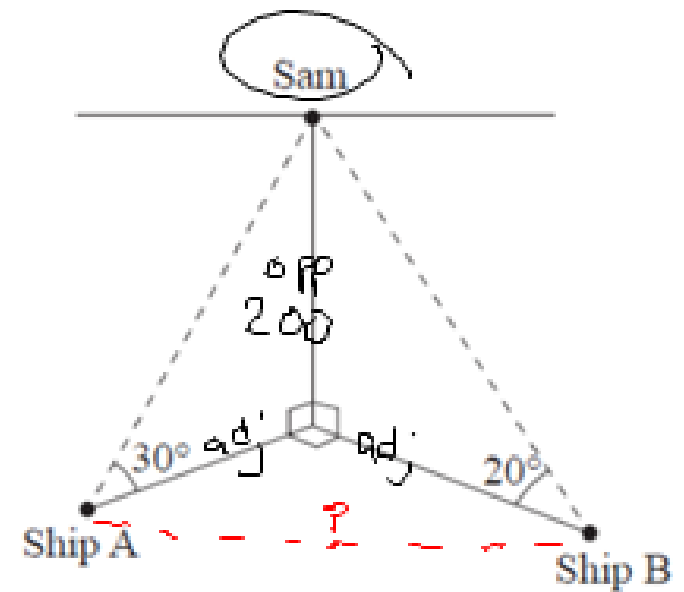
$$5.6^2 - 2.5^2 = a^2$$

$$5.0110 = a$$

$$189.8766 \div 26.04 = 7.2917$$

Need 8 rail cars

31. Sam stands at the top of a 200 m cliff and observes two ships on the ocean. Ship A is due SOUTH of Sam's position and Ship B is due EAST of his position as shown in the diagram.



Ship A  $\tan \theta = \frac{\text{opp}}{\text{adj}}$   
 $\tan 30^\circ = \frac{200}{\text{adj}}$

$\text{adj} = \frac{200}{\tan 30}$        $\text{adj} = 346.4102 \text{ m}$

Ship B  $\tan \theta = \frac{\text{opp}}{\text{adj}}$   
 $\tan 20^\circ = \frac{200}{\text{adj}}$

$\text{adj} = \frac{200}{\tan 20^\circ}$        $\text{adj} = 549.4955 \text{ m}$

$$a^2 + b^2 = c^2$$

$$(346.4102)^2 + (549.4955)^2 = c^2$$

$$649.5732 \text{ m} = c$$

$c = 649.6 \text{ m}$

32. The volume of the prism shown is  $6q^3$ .

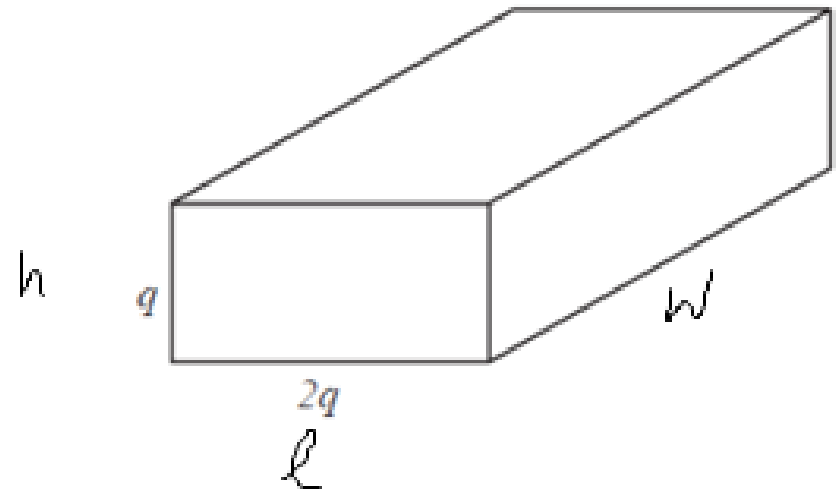
Determine the simplified expression for the surface area of the prism.

$$V = l \cdot w \cdot h$$

$$6q^3 = (2q)(q)(w)$$

$$\frac{6q^3}{2q^2} = \frac{2q^2 w}{2q^2}$$

$$3q = w$$

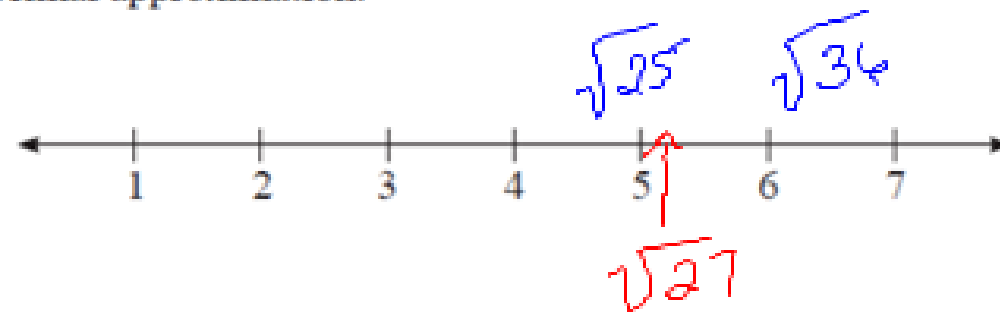


$$SA = 2lw + 2lh + 2hw$$

$$SA = 2(2q)(3q) + 2(2q)(q) + 2(q)(3q)$$
$$= 12q^2 + 4q^2 + 6q^2$$

$$= 22q^2$$

33. Using the number line below, indicate where  $\sqrt{27}$  should be placed and justify your choice without converting to a decimal approximation.



$\sqrt{27}$  is between  $\sqrt{25}$  &  $\sqrt{36}$  but closer to  $\sqrt{25}$   $\therefore \sqrt{27}$  will be closer to 5 than 6

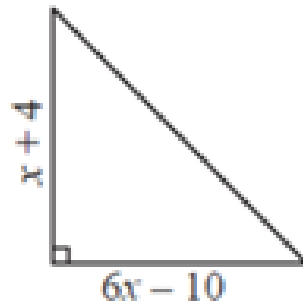
34. Expand and simplify  $(2p + 4)(p^2 - 3p + 1) - 2p(p^2 - 2)$ .

$$\begin{aligned} &= 2p^3 - 6p^2 + 2p + 4p^2 - 12p + 4 - [2p^3 - 4p] \\ &= 2p^3 - 6p^2 + 2p + 4p^2 - 12p + 4 - 2p^3 + 4p \\ &= -2p^2 - 6p + 4 \end{aligned}$$



35. If the area of the right triangle is the same as the area of the rectangle, determine the value of  $x$ .

$$A = \frac{bh}{2}$$

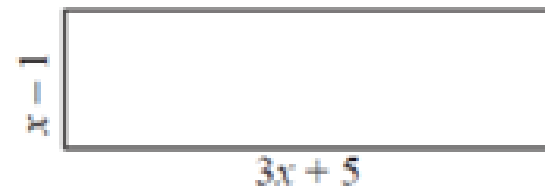


$$A = \frac{(6x-10)(x+4)}{2}$$

$$A = \frac{6x^2 + 14x - 40}{2}$$

$$A = 3x^2 + 7x - 20$$

$$A = l \cdot w$$



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

$$= 3x^2 + 2x - 5$$

$$\cancel{3x^2} + 7x - 20 = \cancel{3x^2} + 2x - 5$$

$$7x - 20 = 2x - 5$$

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

$$\boxed{x = 3}$$

36. Organic Pastures Greenhouse sells organic soil at a fixed price per cubic yard. The company also charges a flat fee for delivery (regardless of the size of the order). Anne ordered 10 cubic yards at a total cost of \$135.00. The following week, Sandy ordered 19 cubic yards at a total cost of \$198.00. What is the company's flat rate delivery charge?

$x$   $y \rightarrow$  flat rate

Anne  $10x + y = 135$   
 Sandy  $(19x + y = 198)$

$$\begin{array}{r} \rightarrow 10x + y = 135 \\ \rightarrow -19x + y = -198 \\ \hline -9x = -63 \\ \underline{-9} \quad \underline{-9} \end{array}$$

$$x = 7$$

$$10(7) + y = 135$$

$$y = 135 - 70$$

$$y = 65$$

\$65.00 flat rate

37. Joe had a chance to go to Bermuda and had only CAD 250 for spending money. He had planned to go to the bank to exchange his money into Bermuda Dollars (BMD) at a rate of 1 CAD = 1.1042 BMD. However he "ran out of time" and exchanged his money at a booth at the airport and they gave him BMD 262.70.

How much money did he lose by waiting to exchange his money at the airport?

BMD \$ 13.35

38. Selim is paid \$10.34 per hour and works 40 hours per week. He earns a 4% commission on all sales. His average gross weekly income is \$633.60. What is the value of his average weekly sales?

$S \rightarrow$  sales

$$10.34(40) + 0.04S = 633.60$$

$$413.6 \overset{-413.6}{+} 0.04S = 633.60 \overset{-413.6}{-}$$

$$\frac{0.04S}{0.04} = \frac{220}{0.04}$$

$$S = \$5500.00$$