

Practice Exam-4- C2

Part A Questions 1 to 6

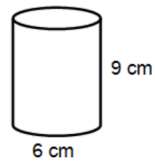
Each question in this part of the examination is worth 4 marks.

In the *Student Booklet*, fill in the box under the letter that corresponds to your answer.

1. Which of the following expresses the number 0.000 000 025 in scientific notation?

- A) 25×10^9 C) 2.5×10^8
B) 2.5×10^{-8} D) 25×10^{-9}

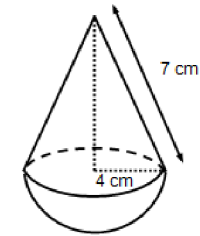
2. A large cylinder has a height of 9 cm and diameter of 6 cm.



Which of the following cylinders is similar to the large cylinder?

- A) 5 cm 7.5 cm C) 1.5 cm 4.5 cm
B) 3 cm 2 cm D) 3 cm 6 cm

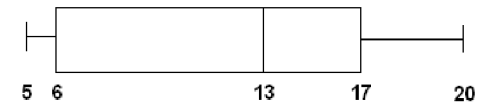
3. A solid is composed of a cone and a hemisphere.



Which of the following shows the total surface area of the solid?

- A) 163.2 cm^2 C) 188.4 cm^2
B) 238.6 cm^2 D) 427.0 cm^2

4. Nine people were asked, at random, how many times they check their emails in a day. This data is summarized in the box-and-whisker plot below.



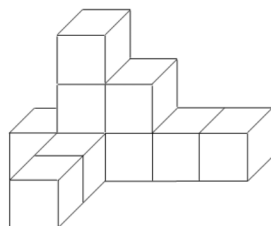
The list of data used to construct the box-and-whisker plot shows eight out of the nine data points. There is a data point missing.

5 5 7 9 13 14 18 20

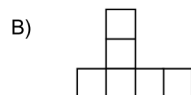
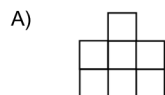
Which of the following shows the missing data point?

- A) 18 C) 16
B) 15 D) 17

5. Ten identical cubes are shown below in oblique perspective.



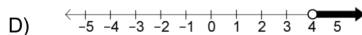
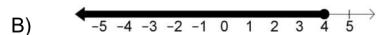
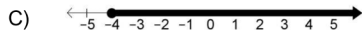
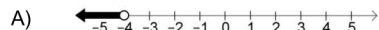
Which of the following images best represents the object viewed from the right side?



6. Consider the inequality below.

$$3(-2x + 5) > 2x + 47$$

Which of the following number lines best represents the solution to the inequality.



Part B Questions 7 to 10

Each question in this part of the examination is worth 4 marks.

In the *Student Booklet*, write your answer in the space provided.

7. Expand and/or simplify the following expressions.

a) $(4a + 5b) - (2a - 3b)$

b) $(5x + 3)(2x - 1)$

c) $\frac{30x^5y^8 - 18x^8y^4}{6x^2y^4}$

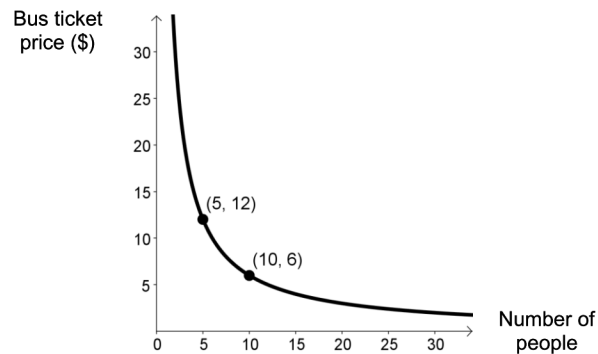
d) $\frac{(m^3n^5)^5}{m^3n^2}$

8. Brianne's class term marks are shown below. Each evaluation is weighted.

Term Content (Weighting)	Brianne's Marks
Mid-Year Exam (40%)	73
Test 1 (20%)	85
Test 2 (20%)	73
Quiz 1 (15%)	64
Quiz 2 (5%)	92
Term Mark	?

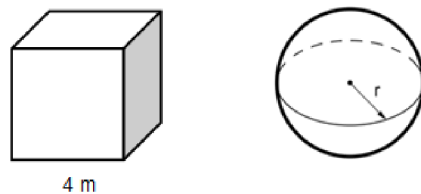
What is Brianne's term mark?

9. The graph below shows the price of a bus ticket in dollars (y) as a function of the number of people going on the trip (x).



What is the price of a bus ticket if 15 people attend the trip?

10. A cube and a sphere have the same volume.



What is the radius of the sphere to the nearest tenth of a metre?

11. Faster Than a Horse

Sir Runsalot boasts that he can outrun a horse in a race.

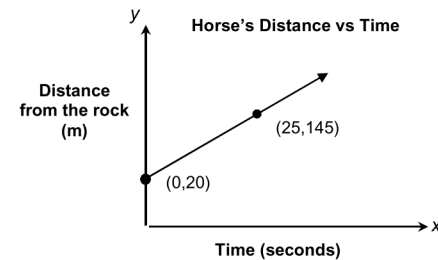
Both the horse and Sir Runsalot start their race a certain distance away from the same rock, however Sir Runsalot gives the horse a head start.



After 5 seconds Sir Runsalot's is 40 m from the rock.

After 12 seconds Sir Runsalot's is 89 m from the rock

The horse's distance from the rock vs time is shown in the graph below.



When does Sir Runsalot catch up to the horse?

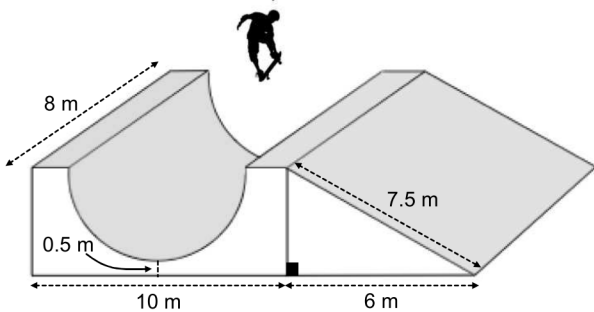
How far is he from the rock?

12. Skateboard Structure

A skateboard structure is being built in a community park. The skateboarders will paint the top surfaces of the structure as represented by the **shaded areas**.

The structure consists of two parts: a ramp in the shape of a right triangular based prism and a half pipe in the shape of a rectangular based prism with a half cylinder cut out.

- The ramp is 7.5 m long with a base of 6 m
- The half-pipe has dimensions of 10 m long and 8 m wide
- The bottom of the half-pipe rests 0.5 m off the ground



Determine the total area the skateboarders will paint.

Use $\pi = 3.14$

Round your answer to the nearest hundredth.

13. Chico's Sporting Goods

Anne and Ben are employees at Chico's Sporting Goods.

Anne works in the shoe department and gets paid \$8.50 per pair of shoes that she sells and an additional \$80.

Ben works in the hockey department and gets paid a fixed amount plus a certain amount for every pair of skates he sells.

The table below shows Ben's earnings as a function of the number of skates he sells.

Ben's Earnings Based on the # of Skates Sold

# of Pairs of Skates Sold	Money Earned (\$)
3	101.50
9	176.50
12	214.00

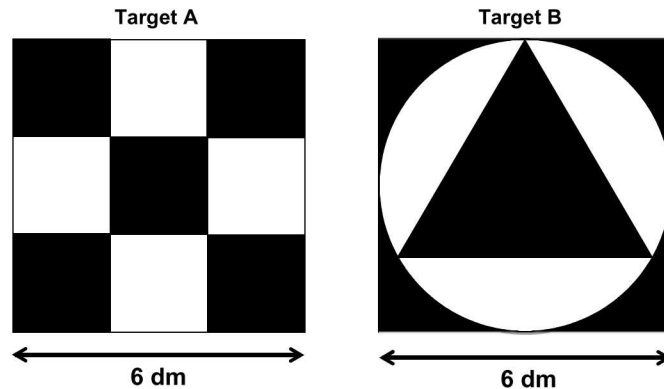
One day, Anne earned \$216. That same day, Ben sold 4 more pairs of skates than the number of pairs of shoes Anne sold.

How much money did Ben earn that day?

14. The Best Target

Assume that an arrow is thrown randomly at a target. If the arrow lands in the black area it is considered a success.

Of the two square targets available: Michelle believes that an arrow shot randomly at Target B has the highest probability of landing in the black area.



- **Target A** is composed of 9 black or white squares of equal size.
- **Target B** is composed of a black triangle with area 13.5 dm^2 inside a white circle with diameter of 6 dm inside a black square with side length 6 dm.

Is Michelle correct in saying that Target B has the highest probability of a success?

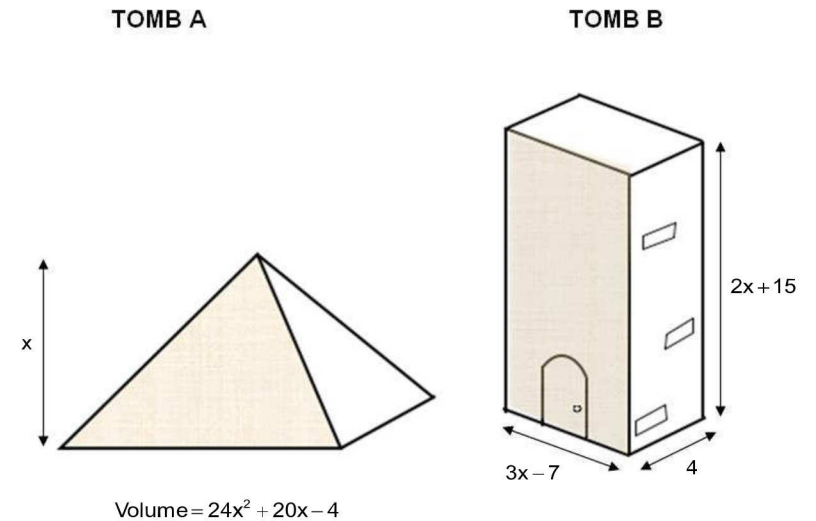
Justify your choice.

15. Tombs and Treasures

Two ancient tombs have the same volume.

Tomb A is a square based pyramid. Tomb B is a rectangular based prism.

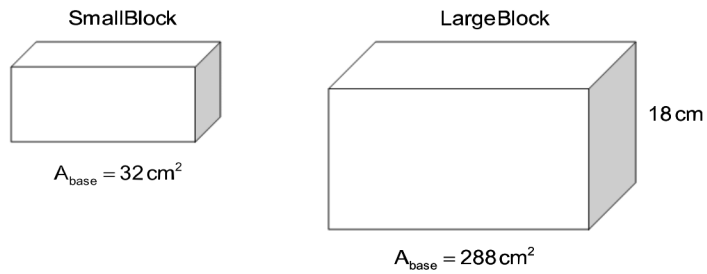
Note: Figures are not drawn to scale and all dimensions are in metres.



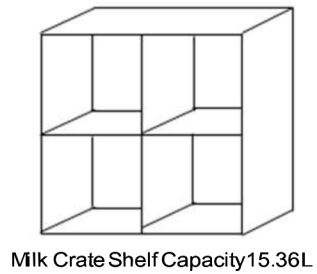
What is the numerical height of Tomb A?

16. Toy Blocks on a Shelf

Tim has a set of toy blocks. He has selected two blocks that are similar, a small block and a large block. The area of the base of the smaller block is 32 cm^2 . The area of the larger block is 288 cm^2 and its height is 18 cm .



Tim stores all of his small blocks on a shelf that used to store milk crates. The whole shelf can store 15.36 L of milk. Assume the whole space will now be filled with small blocks.



How many small blocks can fit on the milk crate shelf?

Answer Key Part A and B

Part A

Questions 1 to 6

Each question is worth 4 marks.

Fill in the box under the letter that corresponds to your answer.

	A	B	C	D
1.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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3.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
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5.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
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Part B

Questions 7 to 10

Each question is worth 4 marks.

Write your answer in the space provided.

7. Write the simplified expressions in the space provided. (1 mark each)
- a) $2a + 8b$ b) $10x^2 + x - 3$
- c) $5x^3y^4 - 3x^5$ d) $m^{18}n^{23}$
8. Brianne's overall term mark is **75 %**. (4 marks or 0)
9. The price of a bus ticket if 15 people attend the trip is **\$ 4** (4 marks or 0)
10. The radius of the sphere, rounded to the nearest tenth is **2.5 m** (4 marks or 0)
(do not penalize students who did not round correctly)

11. Faster than a Horse

A. Example of an appropriate solution

> Sir Runsalot's Equation

(5 seconds, 40 m) (12 seconds, 89 m)

$y = ax + b$ where x = time in seconds, y = distance from rock

$$a = \frac{y_2 - y_1}{x_2 - x_1} = \frac{89 - 40}{12 - 5} = \frac{49}{7} = 7$$

$$b = y - ax$$

$$b = 89 - (7)(12)$$

$$b = 5$$

$$y = 7x + 5$$

> Horse's Equation

$$a = \frac{y_2 - y_1}{x_2 - x_1} = \frac{145 - 20}{25 - 0} = \frac{125}{25} = 5$$

$$b = 20 \text{ from graph}$$

$$y = 5x + 20$$

> System of Equations

$$\text{Sir Runsalot: } y = 7x + 5$$

$$\text{Horse: } y = 5x + 20$$

> Solving the System of Equations

$$7x + 5 = 5x + 20$$

$$2x = 15$$

$$x = 7.5 \text{ seconds}$$

> Check for the Distance

$$y = 7(7.5) + 5 = 57.5 \text{ m}$$

$$y = 5(7.5) + 20 = 57.5 \text{ m}$$

> Conclusion

Sir Runsalot catches up to the horse at 7.5 seconds at a distance of 57.5 m from the rock.

12. Skateboard Ramp

A. Example of an appropriate solution

> Height of triangular based prism ramp

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

$$b^2 = 7.5^2 - 4.5^2$$

$$b^2 = 56.25 - 36$$

$$b^2 = 20.25$$

$$b = 4.5 \text{ m}$$

> Surface Area of the top of triangular based prism

$$A_{\text{rect}} = (l)(w)$$

$$A_{\text{rect}} = (7.5)(8)$$

$$A_{\text{rect}} = 60 \text{ m}^2$$

> Radius of Cylinder

$$r = 4.5 - 0.5$$

$$r = 4 \text{ m}$$

> Surface area of half cylinder

$$A_r = \frac{2\pi rh}{2}$$

$$A_r = \pi rh$$

$$A_r = \pi(4)(8)$$

$$A_r = 3\pi \approx 3.14$$

$$A_r = 100.48 \text{ m}^2$$

> Surface area of top rectangles

$$A_{\text{rect}} = 2(l)(w)$$

$$A_{\text{rect}} = 2(1)(8)$$

$$A_{\text{rect}} = 16 \text{ m}^2$$

> Total surface area

$$A_r = 60 + 100.48 + 16$$

$$A_r = 176.48 \text{ m}^2$$

■ 13. Chico's Sporting Goods

A. Example of an appropriate solution

➤ Identify Anne's Equation

x represents the number of items sold
 y represents the money earned

$$y = 8.5x + 80$$

➤ Ben's Equation

$$a = \frac{y_2 - y_1}{x_2 - x_1} = \frac{176.5 - 101.5}{9 - 3} = \frac{75}{6} = 12.5$$

$$b = y - ax$$

$$b = 101.5 - 12.5 \cdot 3$$

$$b = 64$$

$$y = 12.5x + 64$$

➤ Number of Shoe's Sold

$$y = 8.5x + 80$$

$$216 = 8.5x + 80$$

$$-80 \quad -80$$

$$136 = 8.5x$$

$$x = 16$$

➤ Money Ben Earned

$$x = 20 \text{ since } 4 \text{ more items sold}$$

$$y = 12.5x + 64$$

$$y = 12.5 \cdot 20 + 64$$

$$y = \$314$$

➤ Conclusion

Ben made **\$314**

■ 14. The Best Target

A. Example of an appropriate solution

➤ Probability of Target A

$$P_A = \frac{A_{black}}{A_{target}} = \frac{5}{9} = 0.5555555$$

➤ Probability of Target B

$$P_B = \frac{A_{square} - A_{circle} + A_{triangle}}{A_{target}} = \frac{36 - \pi(3)^2 + 13.5}{9} = \frac{21.24}{36} = 0.59$$

➤ Conclusion

Target B has the highest probability of a success so Michelle is **correct**

Target B has a probability of $0.59 > 0.555$.

5. Tombs and Treasures

Example of an appropriate solution

Volume of Tomb B

$$V = A_b h$$

$$V = (3x - 7) \cdot 4(2x + 15)$$

$$V = (12x - 28)(2x + 15)$$

$$V = 24x^2 + 180x - 56x - 420$$

$$V = 24x^2 + 124x - 420$$

Volume of Tomb A

$$V = 24x^2 - 20x - 4$$

➤ Volume of Tomb A Equals Tomb B

$$24x^2 + 20x - 4 = 24x^2 + 124x - 420$$

$$20x - 4 = 124x - 420$$

$$-124x \quad -124x$$

$$-104x - 4 = -420$$

$$+4 \quad +4$$

$$-104x = -416$$

$$x = 4$$

➤ Conclusion

The numerical value for the height of the pyramid is **4**.

■ 16. Toy Blocks on a Shelf

A. Example of an appropriate solution

➤ Determine the area ratio

$$k^2 = \frac{A_{big}}{A_{small}} = \frac{288}{32} = 9$$

➤ Determine the value of k and or k³

$$k = \sqrt{9}$$

$$k = 3$$

$$k^3 = 27$$

➤ Determine the volume of the small block

Option 1

Option 2

$$h_{small} = \frac{h_{big}}{k}$$

$$= \frac{18}{3}$$

$$= 6 \text{ cm}$$

$$V_{small} = \frac{V_{big}}{k^3} = \frac{(288 \cdot 18)}{27}$$

$$= 192 \text{ cm}^3$$

$$V = A_b h$$

$$V = (32 \cdot 6)$$

$$V = 192 \text{ cm}^3$$

➤ Convert volume into Litres

$$192 \text{ cm}^3 = 0.192 \text{ L}$$

➤ Find the number of small blocks that can fit in the shelf

$$15.36 \div 0.192 = 80 \text{ blocks}$$

➤ Conclusion

80 blocks can fit in the shelf.