Name: _____ Class: _____

St George Girls High School

Year 9

Assessment Task 3

October 2024

Mathematics

Instructions

1. Write in blue or black pen.
2. Show all working.
3. Marks may not be awarded for careless or badly arranged work.
4. Calculators approved by NESA may be used.
5. Diagrams are not drawn to scale.

Time Allowed: 50 minutes

Marks: 42

Section	Marks	Total
A – Equations		**24**
B – Non-Linear Relationships		**7**
C – Area, Surface Area and Volume		**11**
Total		**42**
	%	

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Section A

Equations – 24 marks **Marks**

1. Solve the following equations: **2**

   a) $\frac{4}{y-2} = \frac{5}{2y-7}$

   b) $\frac{3}{2k} - \frac{2}{3k} = \frac{5}{18}$ **2**

2. Solve the inequality: **2**

   $\frac{-3(x-5)}{2} < 12$

Section A (continued) Marks

3. Solve the following pair of simultaneous equations using the elimination method. **3**

$$2x + 5y = 7$$
$$3x + 2y = -6$$

4. Solve the following equations: **3**

a) $2m - \frac{m-6}{5} = \frac{3m-1}{4}$

b) $-3x^3 - 120 = 255$ **2**

Section A (continued) Marks

5. Solve the following equations: **2**

a) $x^2 = 2x$

b) $x^2 - 9x + 20 = 0$ **2**

6. When two consecutive positive even numbers are multiplied, the result is 48. **3**
Form an equation and then solve it to find the two numbers.

Section A (continued)

Marks

7. The adjacent sides in a parallelogram are in the ratio $3:2$, and the total perimeter is 150cm. **3**

   Using this information, form a pair of simultaneous equations and then solve them to find the length of each side of the parallelogram.

End of Section A

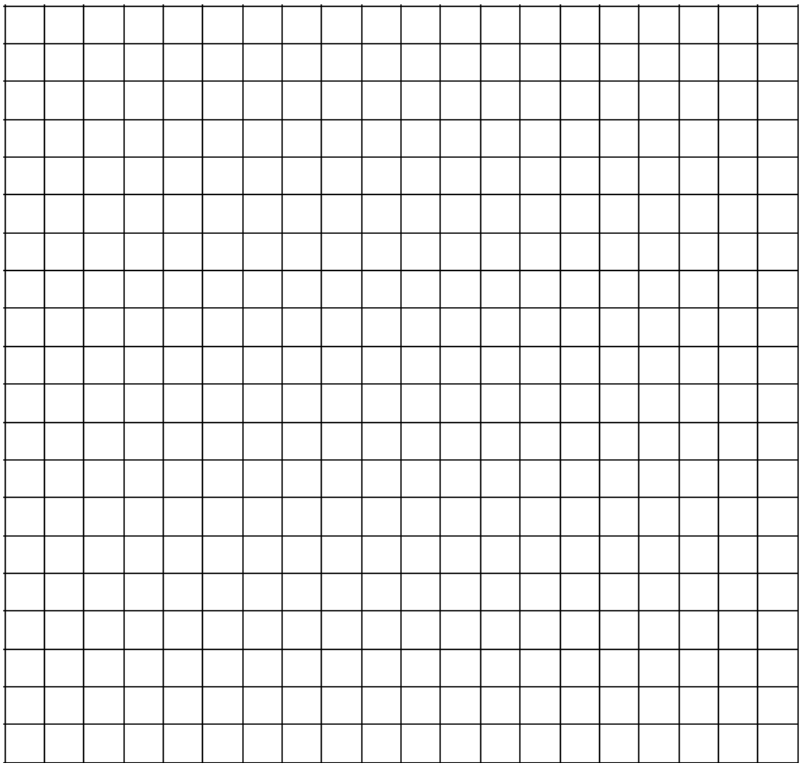
Section B

Non-linear Relationships – 7 marks **Marks**

1. a) Complete the table of values below for the quadratic equation $y = 2x - x^2$. **1**

x	-2	-1	0	1	2	3	4
y							

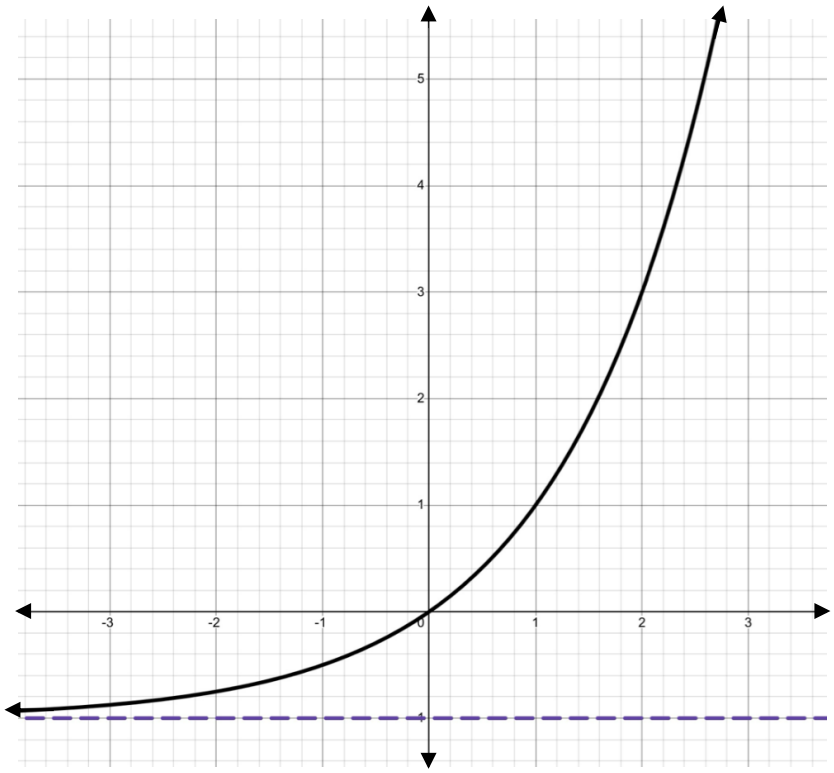
b) Hence, graph $y = 2x - x^2$ on the grid below. **2**



c) Write the coordinates of the vertex of the graph above and state whether it is a minimum or maximum turning point. **2**

Section B (continued) Marks

2.



Circle the equation below that best represents the curve above. **1**

A. $y = 2^x + 1$

B. $y = 2^x$

C. $y = 2^x - 1$

D. $y = 2^{-x} - 1$

3. How should the graph of $y = x^2$ be transformed to produce the graph of $y = (x + 2)^2$? Circle the correct answer. **1**

A. Translate up by 2 units

B. Translate down by 2 units

C. Translate right by 2 units

D. Translate left by 2 units

End of Section B

Section C

Area, Surface Area, and Volume – 11 marks **Marks**

1. Calculate the exact volume of the solid shape below. **2**

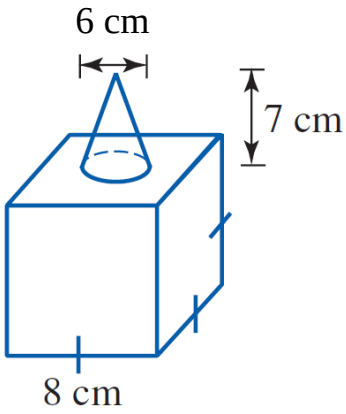


Diagram is not to scale

2. The cylindrical tube below is open at both ends. **2**

The outer surface area of the tube is 660 cm^2.

Determine the radius of the tube to one decimal place.

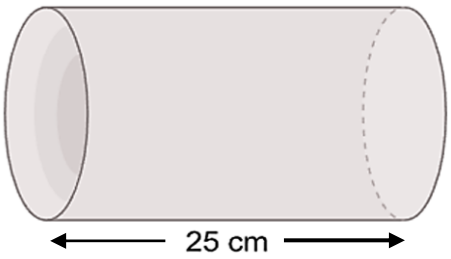


Diagram is not to scale

Section C (continued) Marks

3. a) The surface area of one tennis ball is 136.85 cm^2. **2**

Find the volume of one tennis ball to 1 decimal place.

b) A cylinder has a diameter of 7 cm and a height of 20 cm. **2**

Three tennis balls of the same size as the one mentioned in part a) above are placed inside the cylinder. What volume of space inside the cylinder will not be taken up by the three tennis balls? Give your answer correct to 1 decimal place.

Section C (continued)

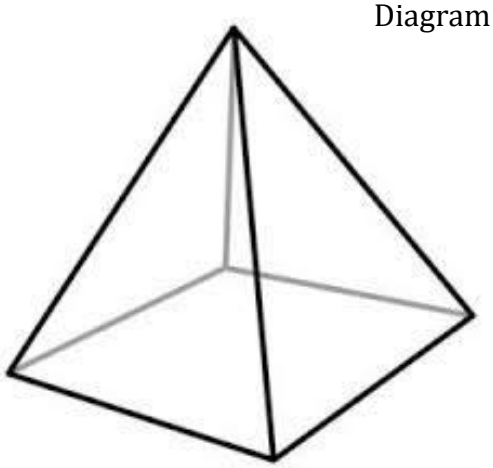
Marks

4. The area of the base of a right square pyramid is 324 cm^2. **3**

   The perpendicular height is 12 cm.

   Calculate the surface area of the pyramid.

Diagram is not to scale



End of Assessment Task

Name: _____ Class: _____

St George Girls High School

Year 9

Assessment Task 3

October 2024

Lose
½ mark for units
½ mark for rounding

Mathematics

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Marks: 42

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Total		**42**
	%	

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Section A

Equations – 23 marks **Marks**

1. Solve the following equations: **2**

a) $\frac{4}{y-2} = \frac{5}{2y-7}$

$4(2y-7) = 5(y-2)$ – 1 mark

$8y - 28 = 5y - 10$

$3y = 18$

$y = 6$ – 1 mark CFPE allowed

b) $\frac{3}{2k} - \frac{2}{3k} = \frac{5}{18}$ **2**

Method 1:

$18k\left(\frac{3}{2k} - \frac{2}{3k}\right) = 18k \times \frac{5}{18}$

- multiply by $18k$ - 1
- multiply both sides $\frac{1}{2}$ (no CFPE)

$27 - 12 = 5k$

$5k = 15 \rightarrow k = 3$ – ½ (CFPE allowed)

Method 2:

$\frac{3(3)}{6k} - \frac{2(2)}{6k} = \frac{5}{18}$

– Forming common denominator 1

– Cross multiply $\frac{1}{2}$

$\frac{5}{6k} = \frac{5}{18}$

$30k = 90 \rightarrow k = 3$ – $\frac{1}{2}$

* Some students formed a common denominator of $6k^2$ and so ended up with the equation $30k^2 = 90k$. They needed to give answers $k = 0$ and $k = 3$ and then explain that $k \neq 0$ because k is on the denominator of original equation.

2. Solve the inequality: **2**

$\frac{-3(x-5)}{2} < 12$

$-3(x-5) < 24$

$-3x + 15 < 24$

$-3x < 9$

$x > -3.$

– 1 mark for reversing direction of inequality

– 1 mark for simplifying correctly.

Made with Goodnotes

Section A (continued) **Marks**

3. Solve the following pair of simultaneous equations using the elimination method. **3**

$2x + 5y = 7$ – ①
$3x + 2y = -6$ – ②

Method 1

① × 3: $6x + 15y = 21$ – ③ – ½
② × 2: $6x + 4y = -12$ – ④ – ½
③ − ④: $11y = 33$
$y = 3$ – 1
SUB $y = 3$ into ①
$2x + 5(3) = 7$
$2x = -8$
$x = -4$ – 1
$\therefore x = -4, y = 3.$

Method 2

① × 2: $4x + 10y = 14$ – ③ – ½
② × 5: $15x + 10y = -30$ – ④ – ½
④ − ③: $11x = -44$
$x = -4$ – 1
SUB $x = -4$ into ①
$2(-4) + 5y = 7$
$5y = 15$
$y = 3$ – 1
$\therefore x = -4, y = 3.$

* Students who did not use elimination method lost 1 mark.

4. Solve the following equations: **3**

a) $2m - \frac{m-6}{5} = \frac{3m-1}{4}$

$\left(2m - \frac{m-6}{5}\right) \times 20 = \frac{3m-1}{4} \times 20$

$40m - 4(m-6) = 5(3m-1)$ – 1mk
$40m - 4m + 24 = 15m - 5$
$36m + 24 = 15m - 5$ – 1mk
$21m = -29$
$\therefore m = \frac{-29}{21}$ – 1mk

* A number of students failed to multiply every term by 20.
* Expansion of $-4(m-6)$ was done very poorly.

b) $-3x^3 - 120 = 255$ **2**

$-3x^3 = 375$ ↩ or 1mk
$x^3 = -125$ ↩
$x = \sqrt[3]{-125}$ ↩ or 1mk
$x = -5$ ↩

* Quite well done.
* Some students thought that $\sqrt[3]{-125} = 5$ and not -5

Section A (continued) **Marks**

5. Solve the following equations: 2

a) $x^2 = 2x$

$x^2 - 2x = 0$

$x(x-2)=0$

$x=0$ or $x-2=0$

$\therefore x = 2$

2 mks - correct solution.

1 mk — any one of the solutions
— significant progress towards the solution.
$x(x-2)=0$

+ A common error was dividing by x

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

$\therefore x = 2$

Don't divide by pronumerals as you may lose solutions

b) $x^2 - 9x + 20 = 0$ 2

$(x-4)(x-5)=0$

$\therefore x = 4$ or 5

1 mk for factorisation

½ mk for each of the solutions.

Quite well done by the majority of students

6. When two consecutive positive even numbers are multiplied, the result is 48. 3

Form an equation and then solve it to find the two numbers.

$x(x+2) = 48$ ← 1 for forming eqn ½ if $x(x+1)=48$

$x^2+2x = 48$

$x^2+2x-48=0$

$(x+8)(x-6)=0$ ← 1 for solving

$\therefore x = -8$ or 6

BUT $x \neq -8$ as $x>0$ ← ½ for justifying removal

$\therefore x = 6$

$\therefore$ the numbers are 6 and 8 ← ½ for answers

* read the Q, it wants two numbers

* Candidates need to remember to put all terms on one side

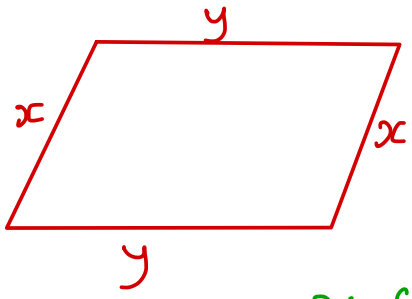
* Many responses 'fudged' their answer of $x=-8$ by removing the −ve

* Always remember to justify the removal of a possible solution

Section A (continued) **Marks**

7. The adjacent sides in a parallelogram are in the ratio $3 : 2$, and the total perimeter is 150cm. **3**

Using this information, form a pair of simultaneous equations and then solve them to find the length of each side of the parallelogram.



$2x + 2y = 150$ ① } ½ for each equation
$2y = 3x$ ②

Sub ① in ②
$\therefore 2x + 3x = 150$
$5x = 150$
$x = 30$ } 1 for solving for x
Sub $x = 30$ in ②
$\therefore 2y = 3(30)$
$= 90$
$y = 45$ } 1 for solving for y
$\therefore$ 30cm and 45cm

* Candidates need to work on forming equations involving ratios
$4x + y = 5$ is clearly false as they do not add to 5cm
↳ $y = 1.5x$ or equivalent
$x = \frac{2}{3}y$ were accepted

* CFE if candidates applied simultaneous equations appropriately from incorrect equations

Note: solving without using simultaneous methods received 1 total

$2x + 2y = 150$ } This was considered to rely more on ratios rather than simultaneous equations
$x = 3a$
$y = 2a$

End of Section A

Section B

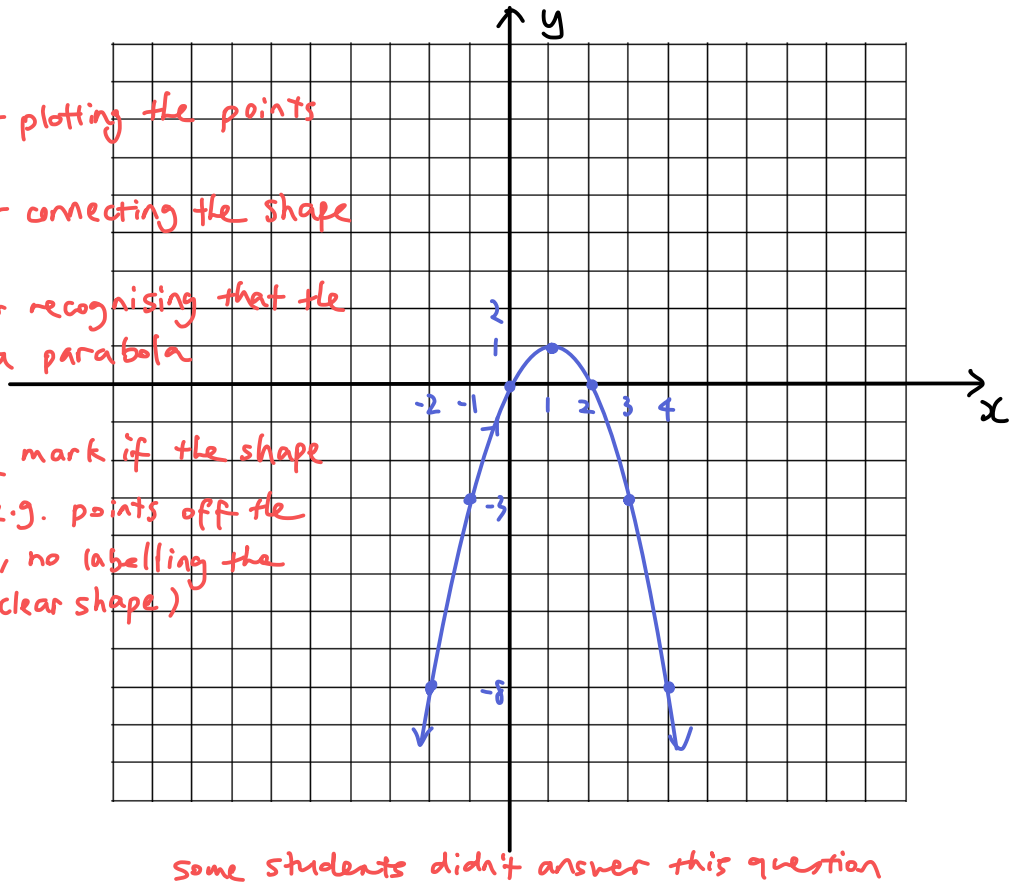
Non-linear Relationships – 7 marks **Marks**

1. a) Complete the table of values below for the quadratic equation $y = 2x - x^2$. **1**

- 1 mistake 0.5 marks
- ≥ 2 mistakes 0 marks

x	-2	-1	0	1	2	3	4
y	-8	-3	0	1	0	-3	-8

b) Hence, graph $y = 2x - x^2$ on the grid below. **2**



- ½ mark for plotting the points
- ½ mark for connecting the shape
- 1 mark for recognising that the shape is a parabola
- deduct ½ mark if the shape is bad (e.g. points off the parabola, no labelling the axis, unclear shape)

Some students didn't answer this question

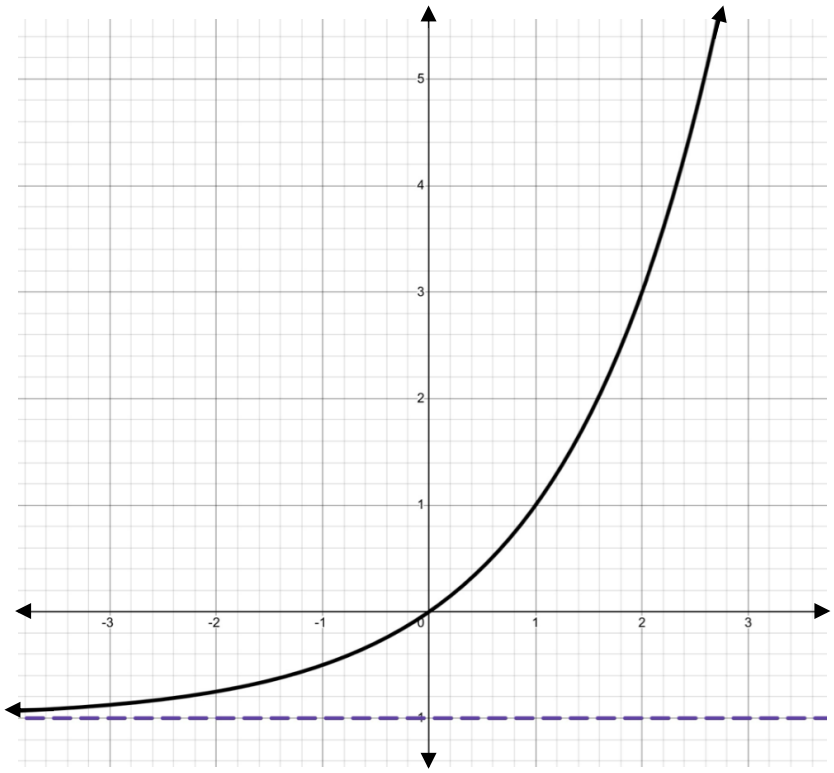
c) Write the coordinates of the vertex of the graph above and state whether it is a minimum or maximum turning point. **2**

(1, 1) maximum

Section B (continued)

Marks

2.



Circle the equation below that best represents the curve above. **1**

A. $y = 2^x + 1$

B. $y = 2^x$

C. $y = 2^x - 1$

D. $y = 2^{-x} - 1$

3. How should the graph of $y = x^2$ be transformed to produce the graph of $y = (x + 2)^2$? Circle the correct answer. **1**

A. Translate up by 2 units

B. Translate down by 2 units

C. Translate right by 2 units

D. Translate left by 2 units

End of Section B

Section C

Area, Surface Area, and Volume – 11 marks **Marks**

1. Calculate the exact volume of the solid shape below. **2**

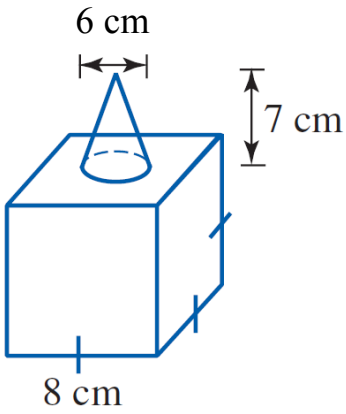


Diagram is not to scale

$V_{cone} = \frac{1}{3}\pi r^2 h$

$= \frac{1}{3} \times \pi \times 3^2 \times 7$ ← ½ mark

$= 21\pi$ ← ½ mark

$V_{cube} = 8^3$ ← ½ mark

$= \cancel{125}\ 512\ cm^3$ ← ½ mark

$\therefore V = 21\pi + \cancel{125}\ 512\ cm^3$

- Some students didn't read the question carefully and tried to find surface area.

2. The cylindrical tube below is open at both ends. **2**

The outer surface area of the tube is 660 cm^2.

Determine the radius of the tube to one decimal place.

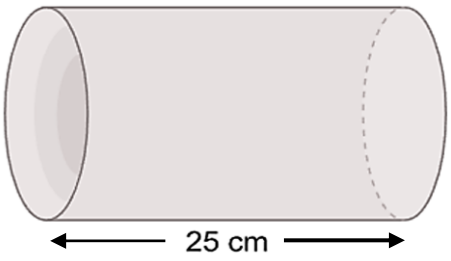


Diagram is not to scale

Curved Surface Area $= 2\pi rh$

$660 = 2\pi r \times 25$ – (1) mark correct formula

$r = \frac{660}{50\pi}$

$r \doteq 4.2$ cm – (1) correct answer

NOTE: Incorrect formula, no marks.
If formula $S.A = 2\pi r^2 + 2\pi rh$ was used (1)/2 was awarded, it made the question much harder if you did this.

Section C (continued) **Marks**

3. a) The surface area of one tennis ball is 136.85 cm^2. **2**

Find the volume of one tennis ball to 1 decimal place.

$S.A = 4\pi r^2$

$136.85 = 4\pi r^2$

$r^2 = \frac{136.85}{4\pi}$

$r = \sqrt{\frac{136.85}{4\pi}}$

$r \doteq 3.3cm$

– (1) mark for correct radius

½ mark awarded IF formula was correct.

(Incorrect formula, no mark)

$V = \frac{4}{3}\pi r^3$

$= \frac{4}{3}\pi \times \left(\sqrt{\frac{136.85}{4\pi}}\right)^3$

$= 150.5\ cm^3$

– (1) mark for correct volume

½ mark awarded IF formula was correct.

(Incorrect formula, no mark)

b) A cylinder has a diameter of 7 cm and a height of 20 cm. **2**

Three tennis balls of the same size as the one mentioned in part a) above are placed inside the cylinder. What volume of space inside the cylinder will not be taken up by the three tennis balls? Give your answer correct to 1 decimal place.

Volume of Cylinder $= \pi r^2 h$

$= \pi (3.5)^2 \times 20$

Volume of 3 spheres $= 3 \times 150.5$

(1) mark – Incorrect formula, no mark.

Volume of space not occupied $= \pi (3.5)^2 \times 20 - 3 \times 150.5$

$= 318.2\ cm^3$

(1) mark

Mark includes the subtraction.

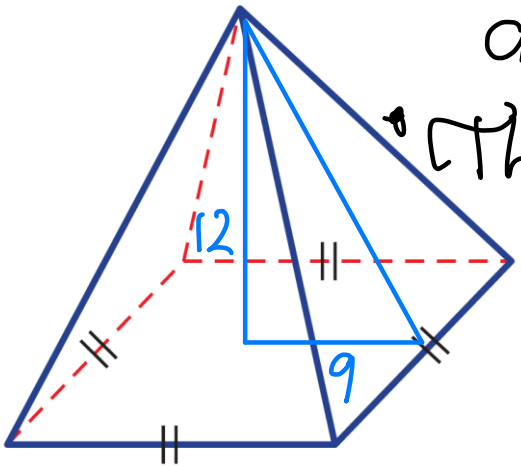
Section C (continued) **Marks**

4. The area of the base of a right square pyramid is 324 cm^3. **3**

The perpendicular height is 12 cm.

Calculate the surface area of the pyramid.

- Question was well answered
- The most common error was using 12cm as slant height



Base side length = $\sqrt{324}$ = 18cm ✓

slant height = $\sqrt{9^2+12^2}$

= 15cm. ✓

SA = $4 \times \frac{1}{2} \times 18 \times 15 + 324$

= 864 cm^2 ✓

2 mark if correct and final answer incorrect

* Zero marks for finding volume.

End of Assessment Task

Made with Goodnotes