



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

NATIONAL ASSESSMENT GENERAL EDUCATION CERTIFICATE (GEC)

2023 GRADE 9 PILOT STUDY

Subject: Mathematics

Paper: 2

Marks: 75

Duration: 120 Minutes
excluding 15 minutes reading time

This test consists of 24 pages, excluding the cover page.

Instructions to the learner:

1. You will receive 15 minutes reading time before you begin answering this test.
2. Read all the instructions and questions carefully.
3. Answer all questions.
4. Use the provided answer sheet to write all your answers.
5. Do your calculations before choosing the correct answer in Section A.
6. ALL calculations must be shown in Section B.
7. Non-programmable scientific calculators may be used, unless you are told not to do so in some questions.
8. Diagrams are not necessarily drawn to scale, all lines are regarded as straight lines unless otherwise stated.

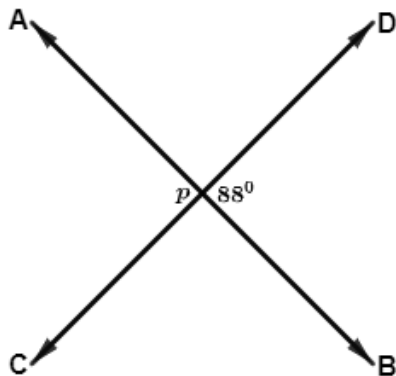
This test starts on the next page.



Do not start to write until you are told to do so.

SECTION A

1.



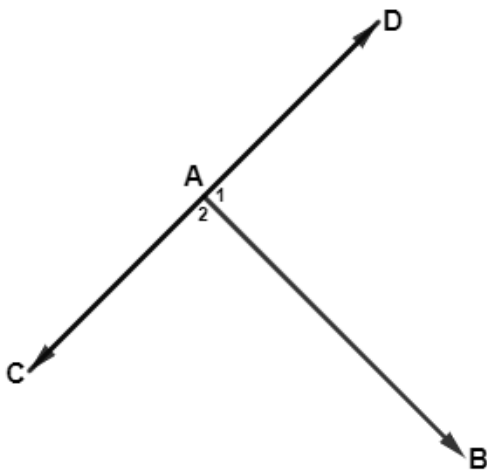
Lines AB and CD are straight lines.

Why is $p = 88^\circ$?

- A It is adjacent to 88° .
- B It alternates with 88° .
- C It is vertically opposite to 88° .
- D It corresponds with 88° .

(1)

2.



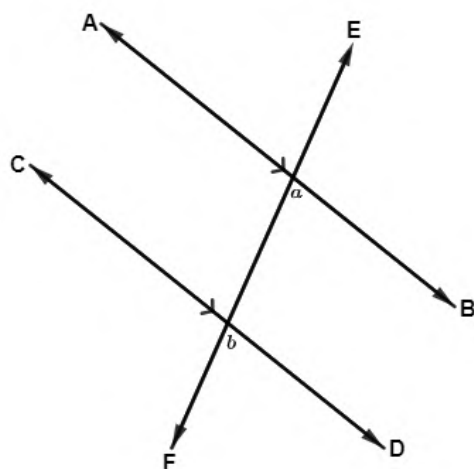
$AB \perp CD$

What is the size of $\hat{A}_1$?

- A 270°
- B 180°
- C 45°
- D 90°

(1)

3.

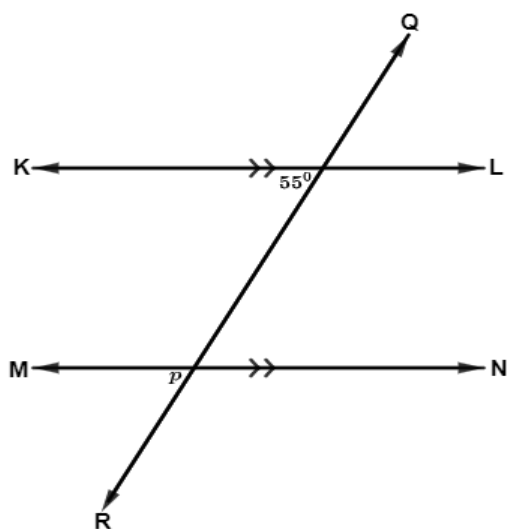


What is the relationship between angles marked a and b ?

- A Complementary angles.
- B Co-interior angles.
- C Corresponding angles.
- D Alternate angles.

(1)

4.

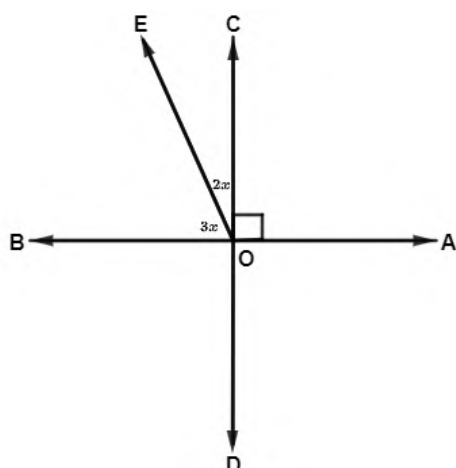


What is the value of p ?

- A 125°
- B 55°
- C 145°
- D 35°

(1)

5.

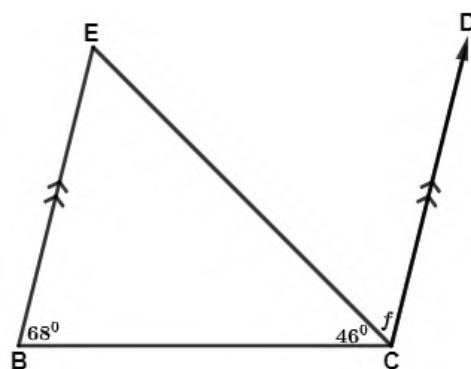


What is the size of $\angle EOB$?

- A 54°
- B 90°
- C 18°
- D 36°

(1)

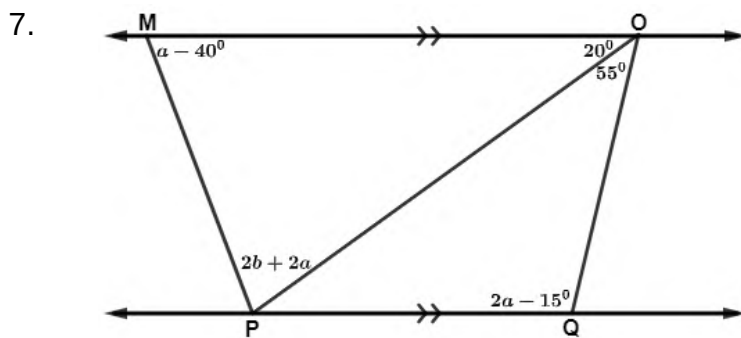
6.



What is the value of f ?

- A 68°
- B 66°
- C 46°
- D 44°

(1)



What is the value of b ?

- A 10°
- B 20°
- C 40°
- D 60°

(1)

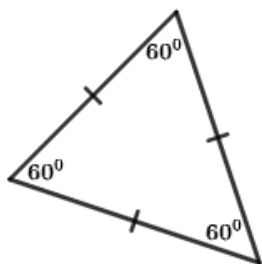
8. A right-angled triangle is a triangle with ...

- A one right angle and two acute angles.
- B one right angle and two obtuse angles.
- C one right angle, one reflex angle and one acute angle.
- D one right angle, one reflex angle and one obtuse angle.

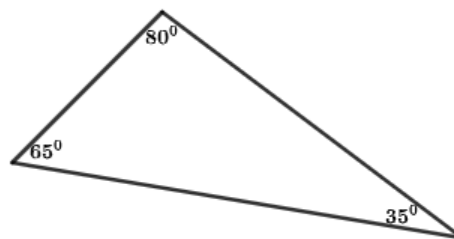
(1)

9. Which one of the following triangles is an equilateral triangle?

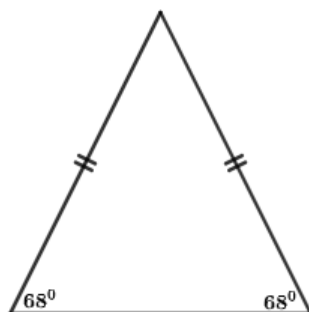
A



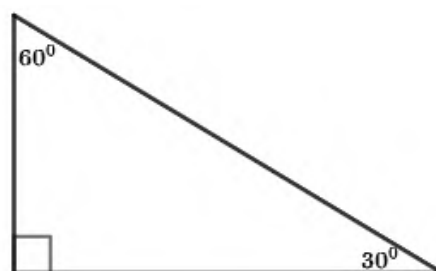
C



B



D



(1)

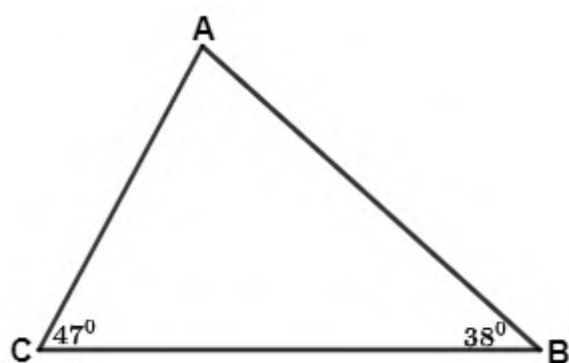
10. Which one of the following statements best describes a kite?

- A The diagonals are perpendicular, one diagonal bisects the other diagonal and one diagonal bisects the angles at the vertices.
 - B The diagonals are perpendicular and bisect each other, bisect the angles at the vertices.
 - C The diagonals are perpendicular and bisect each other.
 - D The diagonals are perpendicular and do not bisect the angles at the vertices.
- (1)

11. Which one of the following statements is true for a square?

- A A square is a trapezium.
 - B A rectangle is a square.
 - C A rhombus is a square.
 - D A square is a rectangle.
- (1)

12.

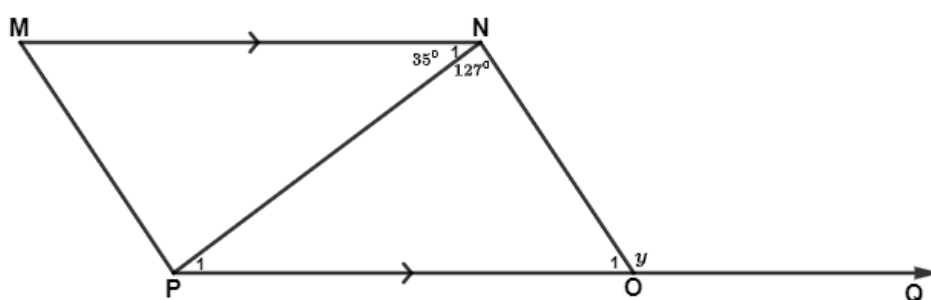


What is the size of $\hat{A}$?

- A 85°
- B 95°
- C 47°
- D 38°

(1)

13.



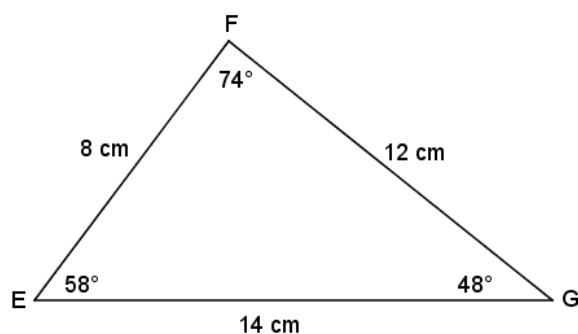
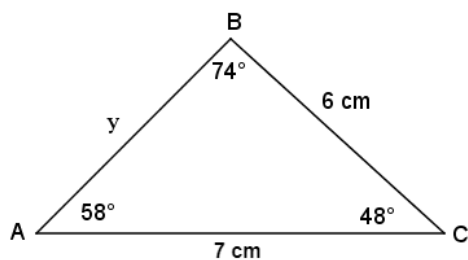
$MN \parallel PQ$

What is the value of y ?

- A 162°
- B 92°
- C 127°
- D 35°

(1)

14.

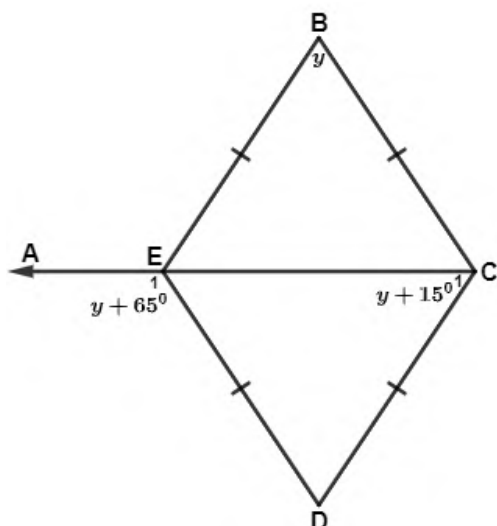


What is the length of side AB?

- A 4 cm
- B 8 cm
- C 6 cm
- D 7 cm

(1)

15.



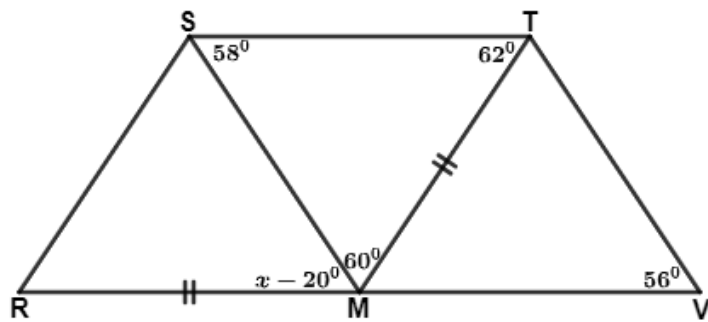
AEC is a straight line.

What is the size of $\hat{E}_1$?

- A 115°
- B 180°
- C 50°
- D 65°

(1)

16.



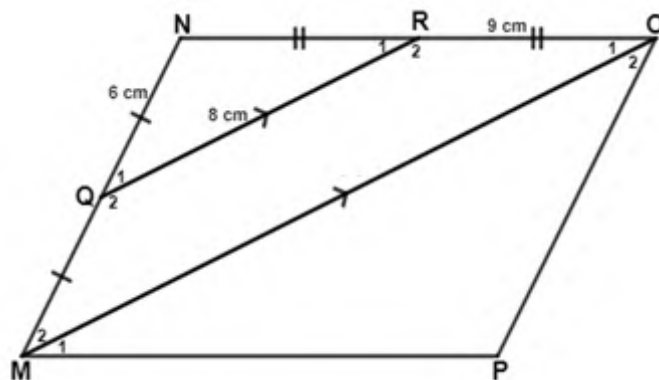
$$\triangle RMS \cong \triangle TMS$$

What is the value of x ?

- A 80°
- B 78°
- C 76°
- D 82°

(1)

17.



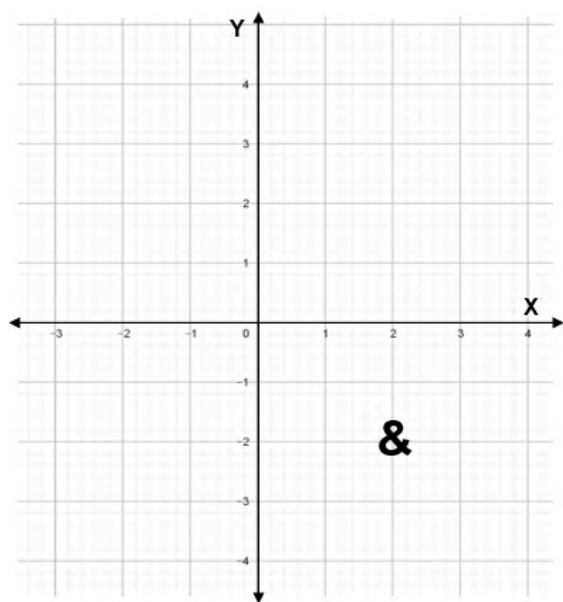
MNOP is a parallelogram and $QR \parallel MO$.

What is the length of MO?

- A 15 cm
- B 13 cm
- C 11 cm
- D 16 cm

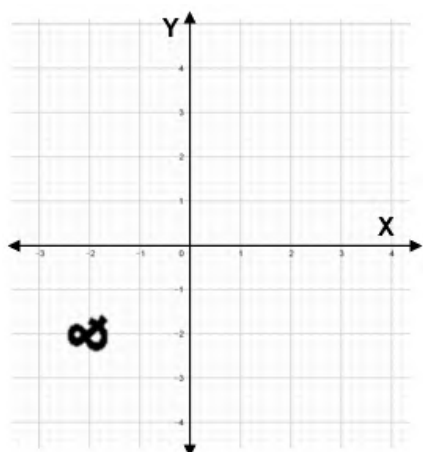
(1)

18.

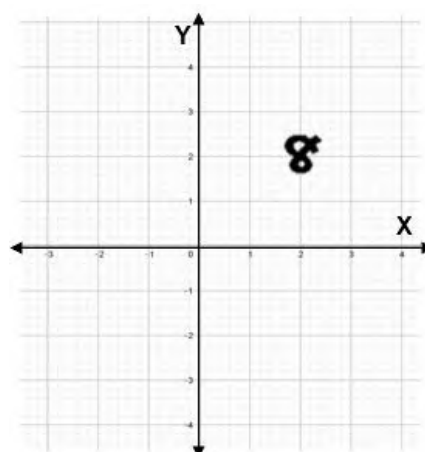


Which one of the following transformations represents reflection in the X-axis?

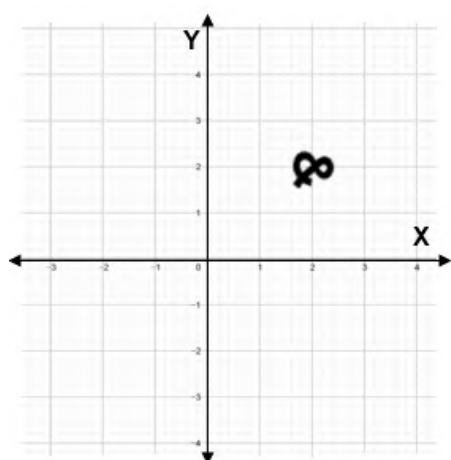
A



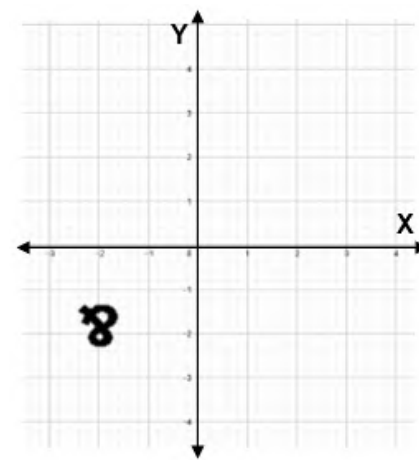
C



B

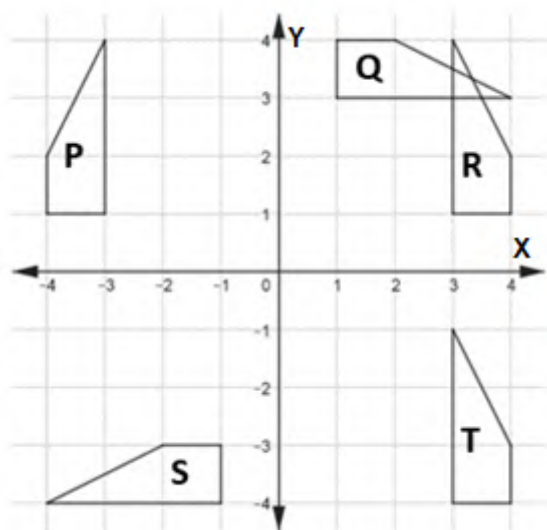


D



(1)

19.



Which two shapes are reflections of each other in the line $y = x$?

- A P and R
- B S and T
- C R and T
- D Q and R

(1)

20. $P(3; -1) \rightarrow P'(1; 3)$

Describe the rule used to transform P to its image P' .

- A Translated 2 units to up and 4 units to the left.
- B Translated 4 units to the left and 2 units up.
- C Translated 2 units to the left and 4 units up.
- D Translated 4 units up and 2 units to the left.

(1)

21. $P'(-2; -7)$ is the reflection of P in the X-axis.

What are the co-ordinates of P?

- A $P(-2; 7)$
- B $P(2; -7)$
- C $P(7; -2)$
- D $P(-7; 2)$

(1)

22. What are the co-ordinates of the image of $Q(3; -5)$ when it is reflected in the X-axis and translated 2 units to the left?

A $Q'(-3; -7)$
B $Q'(1; -5)$
C $Q'(1; 5)$
D $Q'(-5; 7)$ (1)

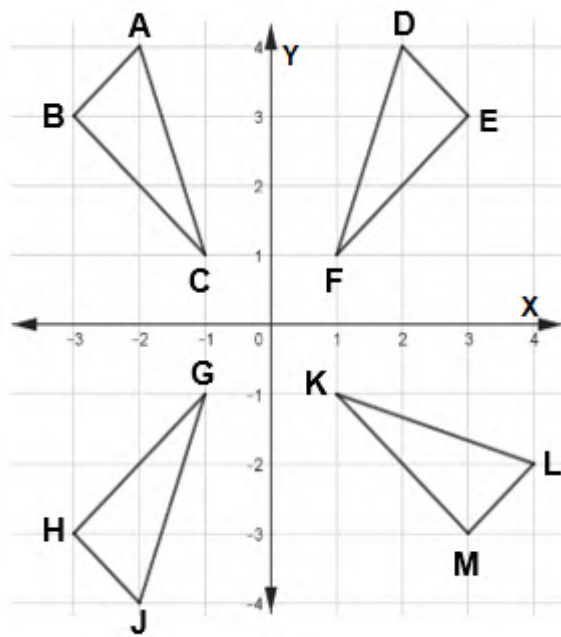
23. Point $(x; y)$ is reflected in the Y-axis and translated 1 unit downwards. What is the rule used to transform point $(x; y)$?

A $(x; y) \rightarrow (x - 1; y)$
B $(x; y) \rightarrow (-x; y - 1)$
C $(x; y) \rightarrow (-x; y)$
D $(x; y) \rightarrow (-x; -y)$ (1)

24. Line AB with $A(-5; 9)$ and $B(1; 2)$ is reflected in the line $y = x$. What are the co-ordinates of A' and B' ?

A $A'(9; 5)$ and $B'(2; -1)$
B $A'(-5; 9)$ and $B'(2; 1)$
C $A'(5; -9)$ and $B'(-1; -2)$
D $A'(9; -5)$ and $B'(2; 1)$ (1)

25.



$X(-2; 4)$; $Y(-3; 3)$ and $Z(-1; 1)$ are coordinates of $\triangle XYZ$.

Which triangle represents the reflection of $\triangle XYZ$ in the line $y = x$?

- A $\triangle ABC$
- B $\triangle DEF$
- C $\triangle GHI$
- D $\triangle KLM$

(1)

26. Triangle ABC is an equilateral triangle with $AB = 5$ cm.
What is the perimeter of triangle ABC?

- A 25 cm^2
- B 15 cm
- C 25 cm
- D 15 cm^3

(1)

27. PQRS is a rectangle.

What is the formula to calculate the area of PQRS?

A $A = \frac{1}{2}bh$

B $A = lb$

C $A = l + b$

D $A = 2(l + b)$ (1)

28. $2\pi r$ is used to calculate ...

A the area of a circle.

B the perimeter of a circle.

C the radius of a circle.

D the diameter of a circle. (1)

29. What is the formula to calculate the area of a circle?

A $A = 2\pi r^2$

B $A = \pi^2 r$

C $A = 2\pi r$

D $A = \pi r^2$ (1)

30. A circle has an area of 198 cm^2 .

What is the diameter, rounded off to TWO decimal places?

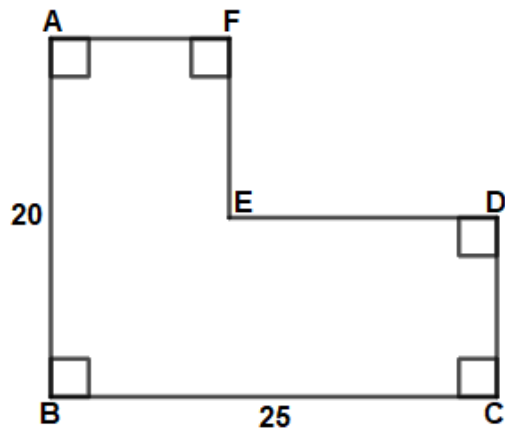
A 63,05 cm

B 15,88 cm

C 12,92 cm

D 31,53 cm (1)

31.

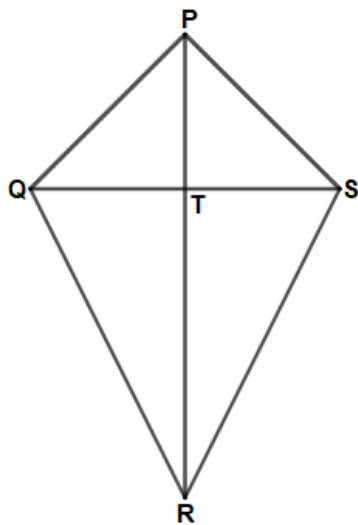


What is the perimeter of the figure ABCDEF?

- A 65
- B 70
- C 45
- D 90

(1)

32.

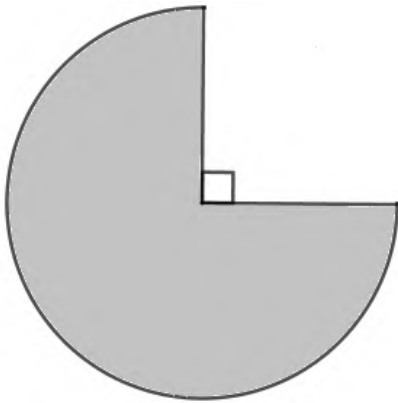


PQRS is a kite with $PR = 16$ cm and $TS = 30$ mm.
What is the area of the kite?

- A 11 cm^2
- B 24 cm^2
- C 48 cm^2
- D 96 cm^2

(1)

33.



The diagram represents three quarters of a circle.

The diameter of the circle is 30 cm.

What is the area of the shaded part (rounded off to the nearest whole number)?

- A 177 cm²
- B 530 cm²
- C 617 cm²
- D 707 cm² (1)

34. DEFG is a rhombus with diagonals $DF = 6x$ cm and $EG = 0,08x$ m.

What is the perimeter of rhombus DEFG in terms of x (rounded off to the nearest whole number)?

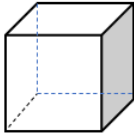
- A $12x$ cm
- B $20x$ cm
- C $14x$ cm
- D $11x$ cm (1)

35. The wheel of the toy car has a diameter of 5 cm.

How many times will the wheel turn if the car covers 2 m (rounded off to the nearest whole number)?

- A 7 times
- B 8 times
- C 10 times
- D 13 times (1)

36.



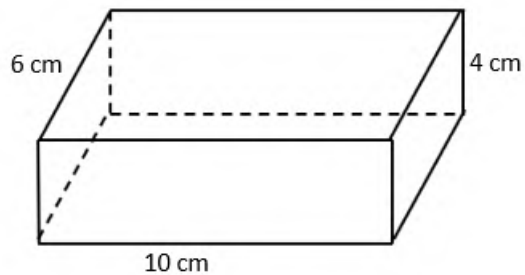
The volume of a cube is 64 cm^3 .

What is the length of a side of the cube in mm?

- A 0,04 mm
- B 400 mm
- C 40 mm
- D 0,4 mm

(1)

37.

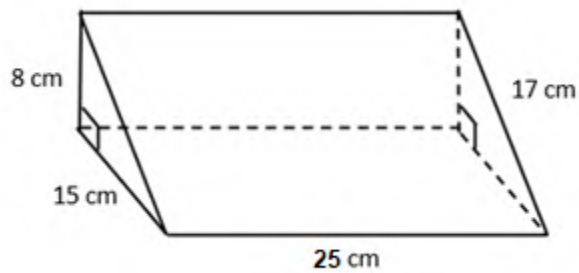


What is the surface area of the rectangular prism?

- A 328 cm^2
- B 240 cm^2
- C 124 cm^2
- D 248 cm^2

(1)

38.



What is the surface area of the prism?

A 1120 cm^2

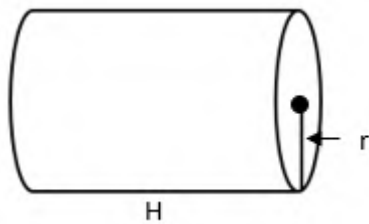
B 1060 cm^2

C 745 cm^2

D 831 cm^2

(1)

39.



Which formula is used to determine the surface area of the cylinder?

A $SA = \pi r^2 + 2\pi rH$

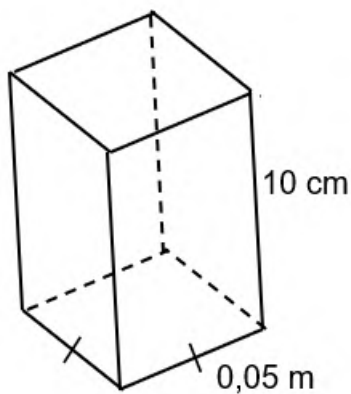
B $SA = 2\pi r^2 + 2\pi rH$

C $SA = 2\pi r + \pi rH$

D $SA = 2\pi r + 2\pi rH$

(1)

40.

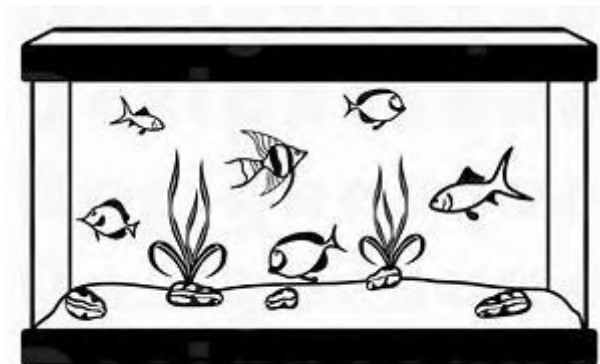


The square-based prism has a side of 0,05 m and a height of 10 cm.
What is the volume in cm^3 ?

- A 0,025 cm^3
- B 125 cm^3
- C 250 cm^3
- D 2,50 cm^3

(1)

41.

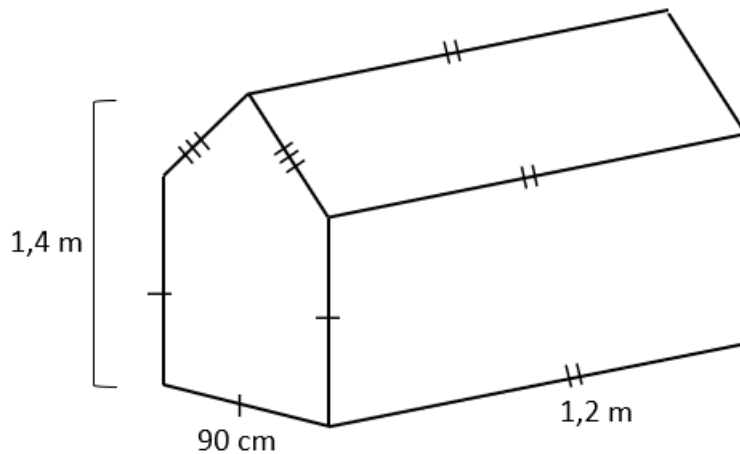


The inside measurement of a fish tank is 90 cm by 400 mm by 600 mm.
What is the capacity of the tank?

- A 216 000 litre
- B 216 litre
- C 216 cm^3
- D 216 000 cm^3

(1)

42.

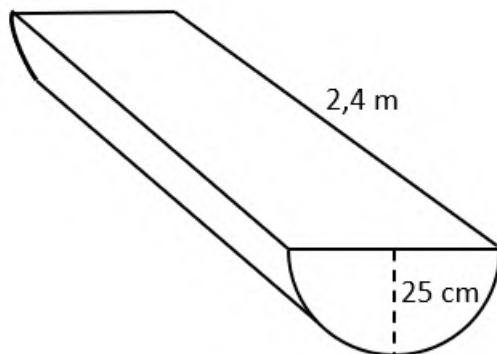


The height of the dog kennel is 1,4 m high.
Determine the volume of the dog kennel in m^3 .

- A 1,197 m^3
- B 1,242 m^3
- C 100,35 m^3
- D 127,68 m^3

(1)

43.

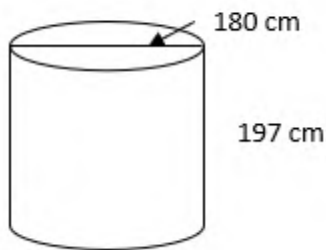


What is the surface area of this half cylinder?

- A 3,28 m^2
- B 8,20 m^2
- C 244,08 m^2
- D 128,24 m^2

(1)

44.



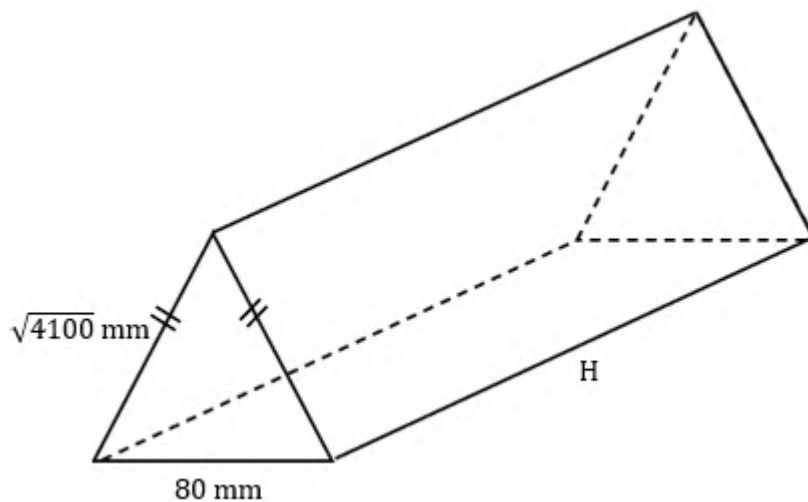
The height of the water tank is 197 cm and the diameter is 180 cm. After some heavy rains, the water lies at the 450 l mark in the tank.

What percentage of the tank will be filled with water?

- A 4,04%
- B 8,98%
- C 0,81%
- D 24,76%

(1)

45.



A cardboard container can hold 300 ml of chocolate milkshake. What is the height of the container as shown above?

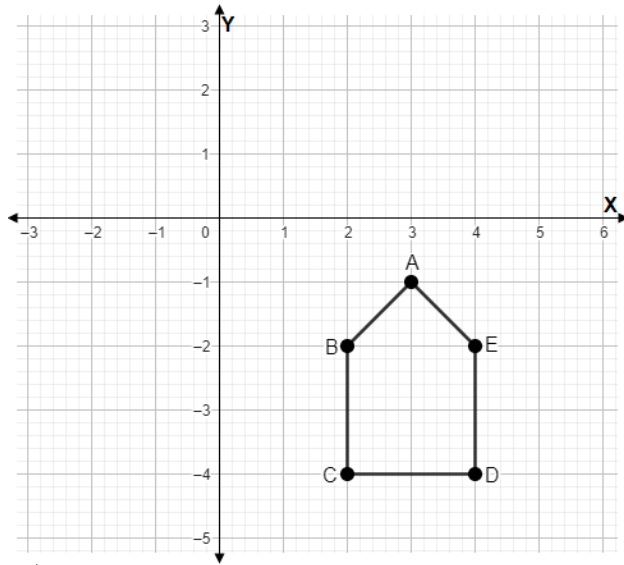
- A 150 cm
- B 150 mm
- C 9,9 mm
- D 1,5 cm

(1)

[45]

SECTION B

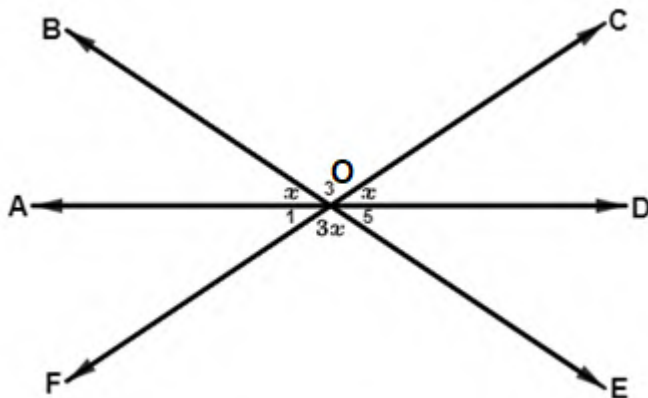
46.



Translate the polygon five units to the left and one unit up.

(3)

47.



Straight lines AD, BE and CF intersect at O.

What is the value of x ?

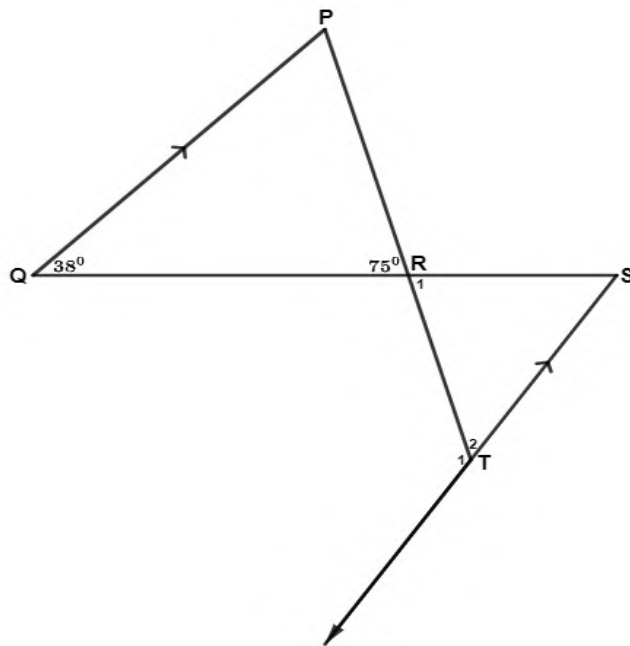
(4)

48. The area of a triangle is 100 cm^2 and its base is 40 mm.

What is the perpendicular height of the triangle?

(3)

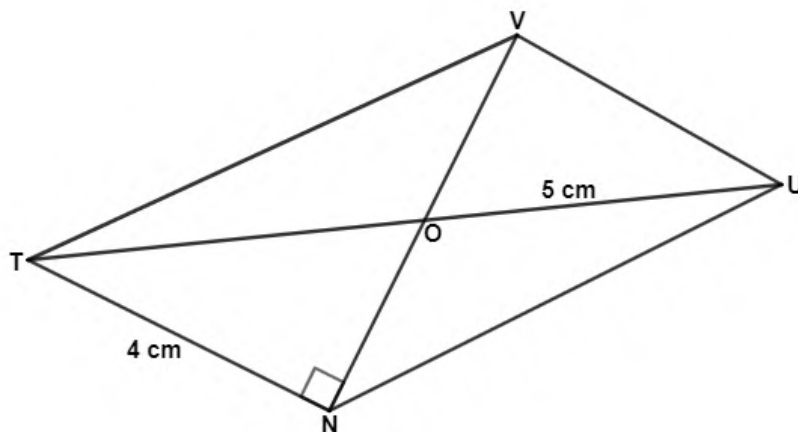
49.



What is the size of $\hat{T}_1$?

(5)

50.



$TVUN$ is a parallelogram.

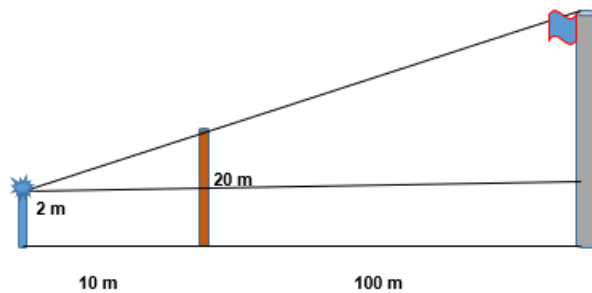
What is the length of ON ?

(5)

51. A company stores boxes in a room with a length of 5 m, breadth of 3 m and height of 2 m.

How many boxes can fit in this room if each box is 10 cm long, 6 cm wide and 4 cm high? (4)

52.



A grade 9 class wants to determine the height of the school's flag pole from the ground.

They use a laser light source mounted on a structure with height 2 m from the ground, to shine light over the wooden beam.

The light shines over the 20 m high wooden beam to the top of the flag pole.

The distance between the flag pole and the wooden beam is 100 m.

The distance between the wooden beam and the light source structure is 10 m.

Determine the height of the flag pole. (6)

[30]

End of test



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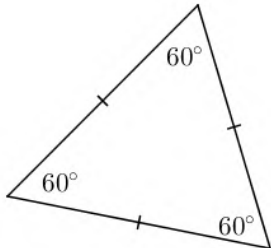
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**GEC PILOT STUDY
MARKING GUIDELINE 2023
MATHEMATICS PAPER 2
GRADE 9**

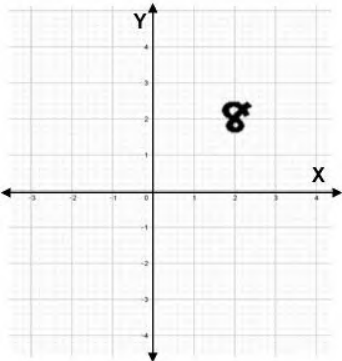
SECTION A

- One mark per answer.
- There are no half marks.

No.		Expected answer		Clarification
1.	C	It is vertically opposite to 88° .	✓	
2.	D	90°	✓	Lines are perpendicular.
3.	C	Corresponding angles.	✓	
4.	B	55°	✓	
5.	A	54°	✓	$3x + 2x = 90^\circ \dots \text{compl } \angle s$ $5x = 90^\circ$ $\frac{5x}{5} = \frac{90^\circ}{5}$ $x = 18^\circ$ $\widehat{EOB} = 3x = 3(18^\circ)$ $\widehat{EOB} = 54^\circ$
6.	B	66°	✓	$68^\circ + \widehat{E} + 46^\circ = 180^\circ \dots \text{sum of } \angle s \text{ of a } \Delta$ $\widehat{E} = 180^\circ - 68^\circ - 46^\circ$ $\widehat{E} = 66^\circ$ $\widehat{E} = f \dots \text{alt } \angle s; EB \parallel DC$ $\therefore f = 66^\circ$ OR $\widehat{B} + \widehat{C} = 180^\circ \dots \text{co-int } \angle s; EB \parallel DC$ $68^\circ + 46^\circ + f = 180^\circ$ $f = 180^\circ - 114^\circ$ $\therefore f = 66^\circ$
7.	A	10°	✓	$20^\circ + 55^\circ + 2a - 15^\circ = 180^\circ \dots \text{co-int } \angle s;$ $MO \parallel PQ$ $2a + 60^\circ = 180^\circ$ $2a = 120^\circ$ $a = 60^\circ$

No.	Expected answer	Clarification
		$2b + 2a + 20^\circ + a - 40^\circ = 180^\circ \dots \text{sum of } \angle\text{s of a } \Delta$ $2b + 2(60^\circ) + 20^\circ + 60^\circ - 40^\circ = 180^\circ$ $2b + 120^\circ + 20^\circ + 60^\circ - 40^\circ = 180^\circ$ $2b = 180^\circ - 160^\circ$ $2b = 20^\circ$ $\frac{2b}{2} = \frac{20^\circ}{2}$ $b = 10^\circ$
8.	A one right angle and two acute angles.	✓
9.	A 	✓
10.	A The diagonals are perpendicular, one diagonal bisects the other and one diagonal bisects the angles at the vertices.	✓
11.	D A square is a rectangle.	✓
12.	B 95°	$\hat{A} + \hat{B} + \hat{C} = 180^\circ \dots \text{sum of } \angle\text{s of a } \Delta = 180^\circ$ $\hat{A} + 47^\circ + 38^\circ = 180^\circ$ $\hat{A} = 180^\circ - 47^\circ - 38^\circ$ $= 95^\circ$
13.	A 162°	$\hat{N}_1 = \hat{P}_1 = 35^\circ \dots \text{alt } \angle\text{s ; } MN \parallel PQ$ $\hat{N}\hat{O}\hat{Q} = \hat{P}_1 + \hat{P}\hat{N}\hat{O} \dots \text{ext. } \angle = \text{sum of 2 opp int } \angle\text{s}$ $= 35^\circ + 127^\circ$ $\therefore y = 162^\circ$ OR $y = \hat{M}\hat{N}\hat{O} \dots \text{alt } \angle\text{s ; } MN \parallel PQ$ $y = 35^\circ + 127^\circ$ $y = 162^\circ$
14.	A 4 cm	$\Delta ABC \parallel \Delta EFG \dots \text{corr. } \angle\text{s} =$ $\frac{AB}{EF} = \frac{BC}{FG} = \frac{AC}{EG} \dots \text{corr. sides are proportional}$ $\frac{y}{8} = \frac{6}{12}$

No.		Expected answer		Clarification
				$y = \frac{6 \times 8}{12}$ $\therefore AB = 4 \text{ cm}$
15.	A	115°	✓	$\widehat{ECD} = \widehat{DEC} = y + 15^\circ \dots \angle s \text{ opp} = \text{sides}$ $y + 15^\circ + y + 65^\circ = 180^\circ \dots \angle s \text{ on a straight line}$ $2y + 80^\circ = 180^\circ$ $2y = 100^\circ$ $y = 50^\circ$ $\widehat{E_1} = y + 65^\circ$ $= 50^\circ + 65^\circ$ $= 115^\circ$ OR $\widehat{B} = \widehat{D} = y \dots \text{opp. } \angle s \text{ of a rhombus} =$ $\widehat{E_1} = \widehat{C_1} + \widehat{D} \dots \text{ext. } \angle = \text{sum of 2 opp int } \angle s$ $y + 65^\circ = y + 15^\circ + y$ $y = 50^\circ$ $\widehat{E_1} = y + 65^\circ$ $= 50^\circ + 65^\circ$ $= 115^\circ$ OR $\widehat{B} = \widehat{D} = y \dots \text{opp. } \angle s \text{ of a rhombus} =$ $\widehat{ECD} = \widehat{DEC} = y + 15^\circ \dots \angle s \text{ opp} = \text{sides}$ $\widehat{ECD} + \widehat{DEC} + \widehat{D} = 180^\circ \dots \text{sum of } \angle s \text{ of } \Delta$ $y + 15^\circ + y + 15^\circ + y = 180^\circ$ $3y = 150^\circ$ $y = 50^\circ$ $\widehat{E_1} = y + 65^\circ$ $= 50^\circ + 65^\circ$ $= 115^\circ$
16.	A	80°	✓	$\Delta RMS \equiv \Delta TMS \dots \text{given}$ $\therefore \widehat{RMS} = \widehat{TMS} \dots \Delta s \text{ congruent}$ $x - 20^\circ = 60^\circ$ $x = 80^\circ$
17.	D	16 cm	✓	In ΔNRQ and ΔNOM: $\widehat{Q_1} = \widehat{M_2} \dots \text{corr. } \angle s; QR \parallel MO$ $\widehat{R_1} = \widehat{O_1} \dots \text{corr. } \angle s; QR \parallel MO$ $\widehat{N} = \widehat{N} \dots \text{common. } \angle \text{ or sum } \angle s \text{ of } \Delta$ $\Delta NRQ \parallel \Delta NOM \quad \angle \angle \angle$ $\frac{NR}{NO} = \frac{RQ}{MO} = \frac{NQ}{NM} \dots \text{corr. sides are proportional}$ $\frac{9}{18} = \frac{8}{MO} = \frac{6}{12} \therefore MO = 16 \text{ cm}$ OR

No.	Expected answer	Clarification
		$\hat{M}_1 = \hat{O}_1 \dots \text{alt.} \angle s ; NO \parallel MP$ $\hat{R}_1 = \hat{O}_1 \dots \text{corr.} \angle s ; MO \parallel QR$ $\therefore \hat{M}_1 = \hat{R}_1$ $\hat{P} = \hat{N} \dots \text{opp.} \angle s \text{ of a parm}$ $\hat{M}_2 = \hat{O}_2 \dots \text{alt.} \angle s ; NO \parallel MP$ $\hat{M}_2 = \hat{Q}_1 \dots \text{corr.} \angle s ; MO \parallel QR$ $\therefore \hat{O}_2 = \hat{Q}_1$ $\Delta NRQ \parallel \Delta PMO \quad \angle \angle \angle$ $PO = QN + QM = 12 \text{ cm} \dots \text{opp. sides of a parm}$ $NR = RO = 9 \text{ cm} \dots \text{given}$ $\text{In } \Delta PMO \text{ and } \Delta NRQ$ $\frac{MO}{RQ} = \frac{PM}{NR} \dots \text{corr. sides are proportional}$ $\frac{MO}{8} = \frac{18}{9}$ $MO = 2 \times 8$ $MO = 16 \text{ cm}$
18.	C	
19.	D	Q and R
20.	C	Translated 2 units to the left and 4 units up.
21.	A	$P(-2 ; 7)$
22.	C	$Q'(1 ; 5)$
23.	B	$(x ; y) \rightarrow (-x ; y - 1)$
24.	D	$A'(9 ; -5)$ and $B'(2 ; 1)$
25.	D	ΔKLM
26.	B	15 cm
27.	B	$A = lb$

No.		Expected answer		Clarification
28.	B	the perimeter of a circle.	✓	
29.	D	$A = \pi r^2$	✓	
30.	B	15,88 cm	✓	$A = \pi r^2$ $198 = \pi r^2$ $r^2 = \frac{198}{\pi}$ $r = \sqrt{\frac{198}{\pi}}$ $\text{Diameter} = \sqrt{\frac{198}{\pi}} \times 2 = 15,88$
31.	D	90	✓	$AB + BC + (FE + DC) + (AF + ED)$ $= 20 + 25 + 20 + 25$ $= 90$
32.	C	48 cm ²	✓	$TS = (30 \div 10) = 3 \text{ cm}$ $QS = 6 \text{ cm} \dots \text{PR bisects QS}$ $\text{Area of PQRS} = \frac{1}{2}(\text{PR} \times \text{QS})$ $= \frac{1}{2}(16 \times 6) = 48 \text{ cm}^2$ $= 48 \text{ cm}^2$
33.	B	530 cm ²	✓	$\text{Radius} = 30 \div 2 = 15 \text{ cm}$ $A = \frac{3}{4}\pi r^2$ $A = \frac{3}{4}\pi(15)^2$ $A = 530 \text{ cm}^2$
34.	B	20x cm	✓	$0,08x \text{ m} = 8x \text{ cm}$ $\frac{8x}{2} = 4x \text{ and } \frac{6x}{2} = 3x \dots \text{diagonals bisect at right angles}$ $\therefore EF^2 = (3x)^2 + (4x)^2 \dots \text{Pyth theorem}$ $EF^2 = 9x^2 + 16x^2$ $EF^2 = 25x^2$ $EF = \sqrt{25x^2}$ $EF = 5x$ $\text{Perimeter} = (5x \times 4)$ $\text{Perimeter} = 20x \text{ cm}$
35.	D	13 times	✓	$r = 5 \div 2 = 2,5 \text{ cm}$ $\text{Perimeter of wheel} = 2\pi r$ $= 2\pi(2,5)$ $= 15,71 \text{ cm}$ $2 \text{ m} = 200 \text{ cm}$ $\text{Number of times the wheel turns}$ $= 200 \div 15,71$ $= 12,73074475 \approx 13 \text{ times}$

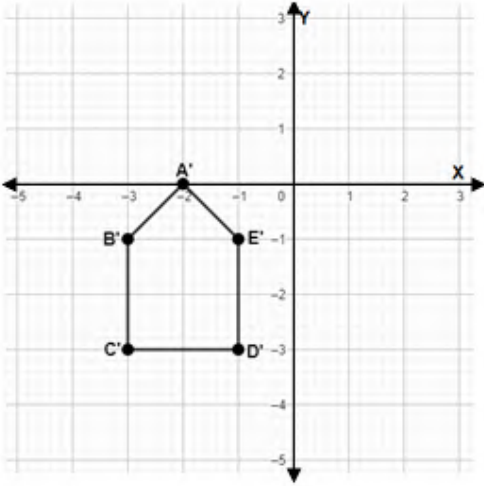
No.		Expected answer		Clarification
36.	C	40 mm	✓	$V = s^3$ $64 = s^3$ $s = 4 \text{ cm} = 40 \text{ mm}$
37.	D	248 cm ²	✓	$SA = 2[(6 \times 4) + (10 \times 4) + (10 \times 6)]$ $= 248 \text{ cm}^2$
38.	A	1120 cm ²	✓	$SA = 2\left(\frac{1}{2} \times 8 \times 15\right) + (25 \times 15) + (17 \times 25)$ $+ (25 \times 8)$ $= 120 + 375 + 425 + 200$ $= 1120 \text{ cm}^2$
39.	B	$SA = 2\pi r^2 + 2\pi rH$	✓	
40.	C	250 cm ³	✓	$0,05 \text{ m} = 5 \text{ cm}$ $V = 5 \times 5 \times 10$ $= 250 \text{ cm}^3$
41.	B	216 l	✓	$400 \text{ mm} = 40 \text{ cm}$ and $600 \text{ mm} = 60 \text{ cm}$ $V = 90 \times 40 \times 60$ $= 216\,000 \text{ cm}^3$ $= 216 \text{ l}$
42.	B	1,242 m ³	✓	$90 \text{ cm} = 0,9 \text{ m}$ H of triangular prism $= 1,4 - 0,9 = 0,5$ $V = (0,9 \times 0,9 \times 1,2)$ $+ \left(\frac{1}{2} \times 0,9 \times 0,5 \times 1,2\right)$ $= 0,972 + 0,27$ $= 1,242 \text{ m}^3$
43.	A	3,28 m ²	✓	$\text{Radius} = 25 \text{ cm} = 0,25 \text{ m}$ $\text{Diameter} = 25 \times 2 = 50 \text{ cm} = 0,5 \text{ m}$ $SA = (0,5)(2,4) + [\pi(0,25)^2 + \pi(0,25)(2,4)]$ $= 1,2 + [0,20 + 1,88]$ $= 3,28 \text{ m}^2$
44.	B	8,98%	✓	$V = \pi(90)^2(197)$ $V = 5\,013\,039,4 \text{ cm}^3$ $5\,013\,039,4 \text{ cm}^3 = 5\,013 \text{ l}$ $\text{Percentage of water in tank:}$ $\frac{450}{5\,013} \times 100 = 8,98\%$
45.	B	150 mm	✓	h^2 of triangle $= (\sqrt{4100})^2 - (40)^2$ $= 4100 - 1600$ $= 2500$ $h = 50 \text{ mm}$ $\text{Area of base} = \frac{1}{2} \times 80 \times 50$

No.		Expected answer		Clarification
				$= 2000 \text{ mm}^2 = 20 \text{ cm}^2$ $300 \text{ ml} = 300 \text{ cm}^3$ $20 \text{ cm}^2 \times H = 300 \text{ cm}^3$ $H = 15 \text{ cm} = 150 \text{ mm}$ OR $h^2 \text{ of triangle} = (\sqrt{4100})^2 - (40)^2$ $= 4100 - 1600$ $= 2500$ $h = 50 \text{ mm} = 5 \text{ cm}$ $\text{Area of base} = \frac{1}{2} \times 8 \times 5$ $= 20 \text{ cm}^2$ $300 \text{ ml} = 300 \text{ cm}^3 \text{ (1 ml = 1 cm}^3\text{)}$ $20 \text{ cm}^2 \times H = 300 \text{ cm}^3$ $H = 15 \text{ cm} = 150 \text{ mm}$
				Section A total
				45

SECTION B

- Do not penalise the learner for the same mistake twice.
- There are no half marks.

MARKING CODES	
M	Method mark
A	Accuracy mark
CA	Consistent Accuracy mark

No.	Expected answer	Clarification	Mark
46.	 ✓✓✓M	Translating 5 units to the left: 1 mark Translating 1 unit up: 1 mark Correct quadrant: 1 mark	3
47.	$\hat{O}_1 = x$...vert opp $\angle$s ✓M $\hat{O}_3 = 3x$ $\hat{O}_5 = x$ $3x + 3x + x + x + x + x = 360^\circ$...angles around point ✓M $10x = 360^\circ$ ✓M $\frac{10x}{10} = \frac{360^\circ}{10}$ $x = 36^\circ$ ✓A OR $\hat{O}_3 = 3x$...vert opp $\angle$s ✓M $3x + x + x = 180^\circ$...$\angle$s on a str line AD ✓M $5x = 180^\circ$ ✓M $\frac{5x}{5} = \frac{180^\circ}{5}$ $x = 36^\circ$ ✓A	Statement and reason: 1 mark Statement and reason: 1 mark Simplification: 1 mark Answer: 1 mark OR Statement and reason: 1 mark Statement and reason: 1 mark Simplification: 1 mark Answer: 1 mark Accept any other straight line used.	4
48.	$40 \text{ mm} = 4 \text{ cm}$ ✓A $A = \frac{1}{2}bh$ $100 = \frac{1}{2} \times 4 \times h$ ✓M $100 = 2h$ $h = 50 \text{ cm}$ ✓A	Correct conversion: 1 mark Substitution into the correct formula: 1 mark Answer: 1 mark	3

No.	Expected answer	Clarification	Mark
49.	$\hat{P} + 38^\circ + 75^\circ = 180^\circ \dots \text{sum of } \angle\text{s of } \Delta$ ✓M $\hat{P} = 180^\circ - 113^\circ$ $\hat{P} = 67^\circ$ ✓CA $\hat{T}_1 + 67^\circ = 180^\circ \dots \text{co-int } \angle\text{s PQ} \parallel \text{ST}$ ✓M $\hat{T}_1 = 180^\circ - 67^\circ$ $\hat{T}_1 = 113^\circ$ ✓✓CA OR $\hat{R}_1 = 75^\circ \dots \text{vert opp } \angle\text{s}$ ✓M $\hat{S} = \hat{Q} \dots \text{alt } \angle\text{s; PQ} \parallel \text{ST}$ ✓M $\hat{S} = 38^\circ$ ✓A $\hat{T}_1 = \hat{R}_1 + \hat{S} \dots \text{ext } \angle = \text{sum of 2 opp int } \angle\text{s}$ ✓M $\hat{T}_1 = 75^\circ + 38^\circ$ $\hat{T}_1 = 113^\circ$ ✓CA OR $\hat{P} + \hat{Q} + \hat{R}_2 = 180^\circ \dots \text{sum of } \angle\text{s of } \Delta$ ✓M $\hat{P} + 38^\circ + 75^\circ = 180^\circ$ $\hat{P} = 180^\circ - 113^\circ$ $\hat{P} = 67^\circ$ ✓CA $\hat{T}_2 = \hat{P} \dots \text{alt } \angle\text{s; PQ} \parallel \text{ST}$ ✓M $\hat{T}_2 = 67^\circ$ $\hat{T}_1 + \hat{T}_2 = 180^\circ \dots \angle\text{s on a str line}$ ✓M $\hat{T}_1 + 67^\circ = 180^\circ$ $\hat{T}_1 = 180^\circ - 67^\circ$ $\hat{T}_1 = 113^\circ$ ✓CA	Statement and reason: 1 mark Answer: 1 mark Statement and reason: 1 mark Answer: 2 marks Statement and reason: 1 mark Statement and reason: 1 mark Answer: 1 mark Statement and reason: 1 mark Answer: 1 mark OR Statement and reason: 1 mark Answer: 1 mark Statement and reason: 1 mark Statement and reason: 1 mark Answer: 1 mark Accept any other correct responses.	5

No.	Expected answer	Clarification	Mark
50.	OU = TO = 5 cm ...diagonals of a parm bisect each other ✓M/A In ΔTON $ON^2 = TO^2 - TN^2$...Pyth theorem ✓M $= (5)^2 - (4)^2$ ✓M $= 25 - 16$ ✓M $= 9 \text{ cm}^2$ ON = 3 cm ✓CA	Statement and reason: 1 mark Statement and reason: 1 mark Substitution: 1 mark Simplification: 1 mark Answer: 1 mark	5
51.	Volume of the room $V = l \times b \times h$ $V = 5 \times 3 \times 2$ $V = 30 \text{ m}^3$ ✓A Volume of the box $V = l \times b \times h$ $V = 10 \times 6 \times 4$ $V = 240 \text{ cm}^3$ ✓A $V = 0,00024 \text{ m}^3$ ✓A Number of boxes = $\frac{30}{0,00024}$ Number of boxes = 125 000 ✓CA OR Volume of the room $V = l \times b \times h$ $V = 5 \times 3 \times 2$ $V = 30 \text{ m}^3$ ✓A $V = 3000000 \text{ cm}^3$ ✓A Volume of the box $V = l \times b \times h$ $V = 10 \times 6 \times 4$ $V = 240 \text{ cm}^3$ ✓A Number of boxes = $\frac{3000000}{240}$ Number of boxes = 125 000 ✓CA	Answer: 1 mark Answer: 1 mark Conversion: 1 mark Answer: 1 mark OR Answer: 1 mark Conversion: 1 mark Answer: 1 mark Answer: 1 mark Accept any other correct responses.	4

No.	Expected answer	Clarification	Mark
52.	Angle formed by the ray of light to the top of the flag pole and the horizontal line from the light source to the pole, is common. ✓M Angle between the wooden beam and the horizontal line from the light source to the pole = angle formed by the flag pole and the horizontal line from the light source = 90°. ✓M ∴ Angle formed by the ray of light and wooden beam = angle formed by the ray of light and the flag pole. ✓M The triangles formed by the light source, wooden beam and flag pole are similar. $\frac{10}{110} = \frac{18}{x} \text{ ✓M}$ $10x = 1980$ $\frac{10x}{10} = \frac{1980}{10}$ $x = 198 \text{ from the height of the light source ✓M}$ $h = 198 + 2$ $h = 200 \text{ m ✓A}$	Identifying the common angle: 1 mark Identifying the angles = 90°: 1 mark Concluding 3rd angles =: 1 mark Proportion: 1 mark Answer: 1 mark Answer: 1 mark	6
Section B total			30