



**basic education**  
Department:  
Basic Education  
REPUBLIC OF SOUTH AFRICA

Marks obtained	
Section A	
Section B	
Total	

**NATIONAL ASSESSMENT  
GENERAL EDUCATION CERTIFICATE (GEC)  
2021**

<b>PILOT STUDY</b>	<b>MATHEMATICS</b>										
<b>GRADE 9</b>	Learner Name _____										
<b>English</b>	School Name _____										
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	<i>To be completed by Test Administrator</i>										
<b>DATE OF COMPLETION</b>											

**This test consists of 43 pages, excluding the cover page.**

### Instructions to the learner

1. Read all the instructions and questions carefully.
2. The teacher will help you through the practice exercises before you start writing the test.
3. Circle the letter of the correct answer.
4. Question 2 demonstrates how to make a correction if you change your answer.
5. Answer all questions.
6. Non-programmable scientific calculators may be used, unless you are told not to do so in some questions.
7. The duration of this test is 90 minutes.

### Practice exercises

Circle the letter of the correct answer from number 1 to 2.

1. Which formula is the correct one to calculate the area of a rectangle?

- A  $(\text{length})^2$
- B  $2 \times \text{length} + 2 \times \text{breadth}$
- C  $\text{length} \times \text{breadth}$
- D  $4 \times \text{length}$

You have answered correctly if you have circled the letter C.

2. What is a quadrilateral with 4 equal sides and the diagonals are not equal in length, called?

- A square.
- B ~~parallelogram.~~
- C rectangle
- D rhombus

If you made a mistake by circling B, draw a line through the letter B and the answer. Then circle the correct letter D.

What is the **main** language spoken at your home?

Tick (✓) next to the applicable language.

Afrikaans	<input type="checkbox"/>	Sesotho	<input type="checkbox"/>
English	<input type="checkbox"/>	Setswana	<input type="checkbox"/>
IsiNdebele	<input type="checkbox"/>	Siswati	<input type="checkbox"/>
IsiXhosa	<input type="checkbox"/>	Tshivenda	<input type="checkbox"/>
IsiZulu	<input type="checkbox"/>	Xitsonga	<input type="checkbox"/>
Sepedi	<input type="checkbox"/>	Other	<input type="checkbox"/>

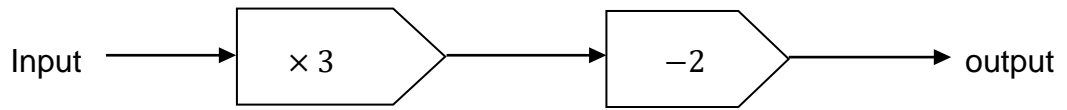
**The test starts on the next page.**



**Do not turn the page until you are told to do so.**

**SECTION A**

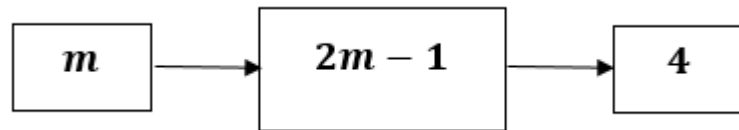
The input value is 15.



1. What is the output value?

- A 3
- B 7
- C 43
- D 47

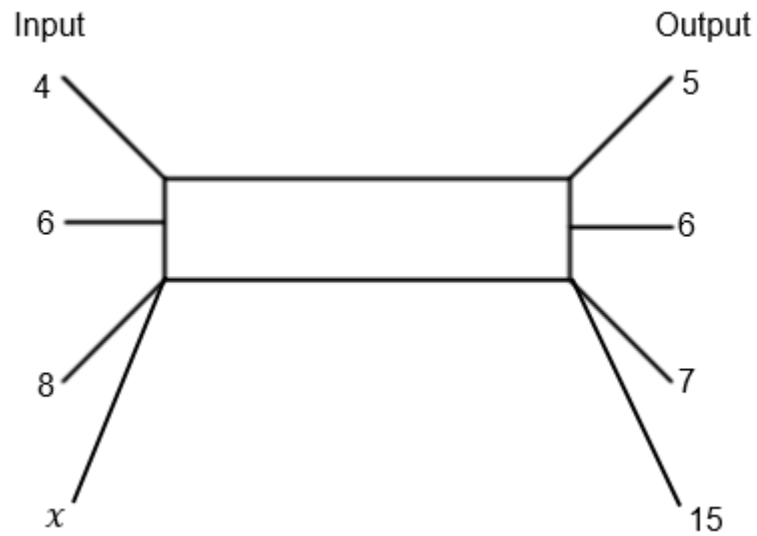
(1)



2. Using the rule above, what is the value of  $m$ ?

- A 7
- B 10
- C  $\frac{5}{2}$
- D  $\frac{3}{2}$

(1)



3. What is the rule and the value for  $x$ ?

- A  $y = 2x - 3; x = 9$
- B  $y = 2x + 3; x = 6$
- C  $y = \frac{1}{2}x + 3; x = 24$
- D  $y = \frac{1}{2}x - 3; x = 36$

(1)

Volume of a cylinder is  $V = \pi r^2 h$ ,  $h = 2\,50$  cm,  $\pi = 3,14$  and  $r = 15$  cm.

4. What is the volume the cylinder, in  $\text{cm}^3$ ?

- A 17 66,25
- B 11 775
- C 176 625
- D 17 662 500

(1)

$x$	1	2	3
$y$	-4	-1	4

5. Which formula best represents the given  $x$  and  $y$  values?

A  $y = 3x - 5$

B  $y = -3x - 1$

C  $y = 3x^2 - 7$

D  $y = x^2 - 5$

(1)

Given the equation:  $y = -4 + (x - 2)^2$

6. Which of the following is equivalent to the given equation?

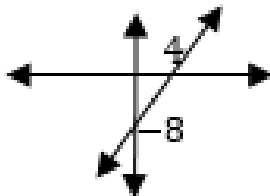
A  $y = 2x + 8$

B

-2	-1	0	1
-12	-10	-6	-4

C Input  $x \times 2 - 4 =$  output  $y$

D



(1)

$A(-2; 3)$  ;  $B(4; -6)$  ;  $C(-1; \frac{3}{2})$

7. Which one of the following equations represents the line which passes through the above points?

A  $4x + 6y - 10 = 0$

B  $3x - 2y - 24 = 0$

C  $-6x - 4y = 0$

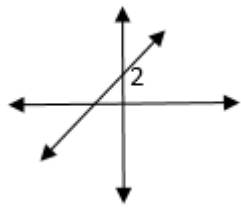
D  $2y + 3x + 2 = 0$

(1)

Given the equation:  $3(x - 1) - 4y - 5 = 0$

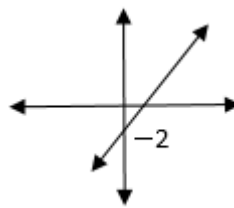
8. Which of the following graphs is represented by the given graphs?

A



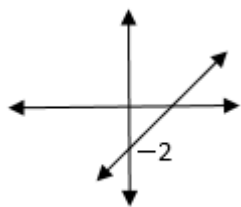
Gradient =  $\frac{3}{4}$

B



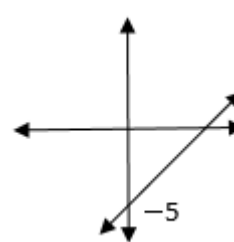
Gradient =  $\frac{3}{4}$

C



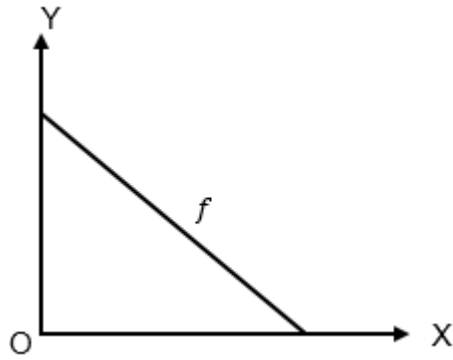
Gradient =  $\frac{4}{3}$

D



Gradient =  $\frac{3}{4}$

(1)

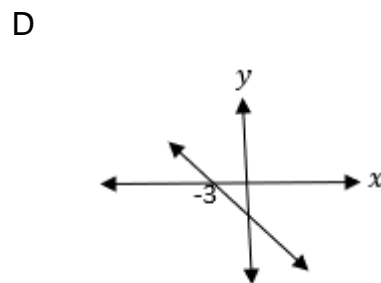
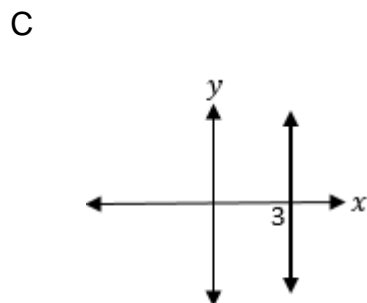
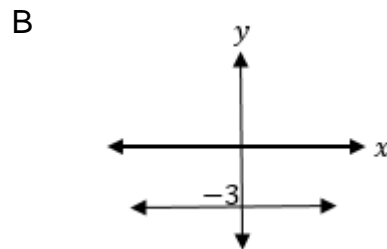
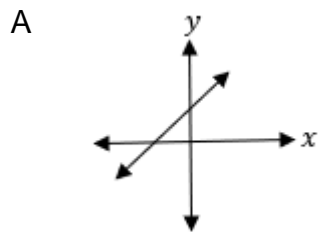


9. Which one of the following phrases best describes the gradient of graph  $f$ ?

- A Gradient is undefined.
- B Gradient is zero.
- C Gradient is negative.
- D Gradient is positive

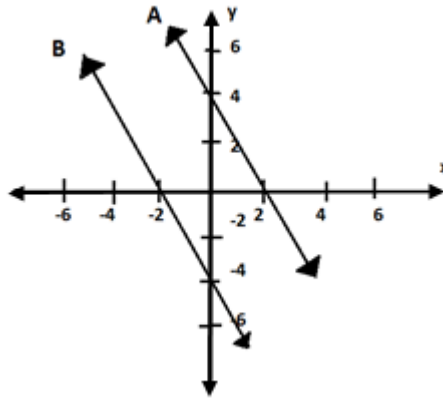
(1)

10. Which one of the following graphs best describes an undefined gradient?



(1)





11. What is the relationship between lines A and B in terms of their gradient?

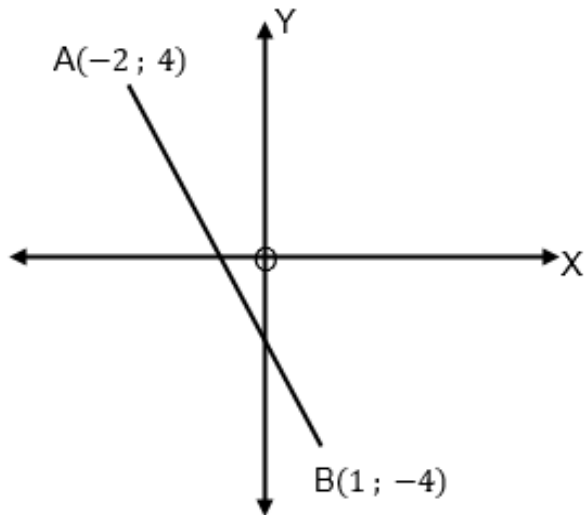
- A Their gradients are equal.
- B The product of their gradients is  $-1$ .
- C The product of their gradients is  $1$ .
- D The sum of their gradients is  $0$ .

(1)

12. Which one of the following statements is true, if two straight lines are perpendicular?

- A The gradients are equal.
- B The product of the gradients is  $1$ .
- C The sum of the gradients is  $0$ .
- D The product of the gradients is  $-1$ .

(1)



13. What is the gradient of the given graph?

- A  $-\frac{3}{8}$
- B  $-\frac{6}{5}$
- C  $-\frac{0}{1}$
- D  $-\frac{8}{3}$

(1)

$$2y - 3x = 4$$

14. Which statement best describes the given equation?

- A Positive gradient and positive  $y$ -intercept.
- B Positive gradient and negative  $y$ -intercept.
- C Negative gradient and positive  $y$ -intercept.
- D Negative gradient and negative  $y$ -intercept.

(1)

$$-\frac{2}{3}y - 2x = 4$$

15. What is the gradient and  $y$  – intercept of the given equation?

A  $m = -3; c = -6$

B  $m = 3; c = 6$

C  $m = -2; c = 4$

D  $m = 2; c = 4$

(1)

16. What are the coordinates of  $Z'$ , the image of  $Z(-3 ; 3)$  if reflected in the X-axis?

A  $(-3 ; -3)$

B  $(3 ; -3)$

C  $(-3 ; 3)$

D  $(3 ; 3)$

(1)

$P(-2 ; -3)$  maps onto  $P'(-2 ; 3)$ .

17. What type of transformation is indicated above?

A Reflection in the X-axis.

B Reflection in the Y-axis.

C Translation to the right.

D Translation downwards.

(1)

$M(x; y)$  is mapped onto  $M'(-3; 5)$ .

18. What are the coordinates of  $M$  if  $M$  is reflected in the X-axis?

A  $(-3; 5)$

B  $(3; 5)$

C  $(-3; -5)$

D  $(3; -5)$

(1)

$D(-2; 3)$  maps onto  $D'(-2; -3)$ , the reflection in the X-axis

19. Which rule represents the above mentioned mapping?

A  $(x; y) \rightarrow (-x; y)$

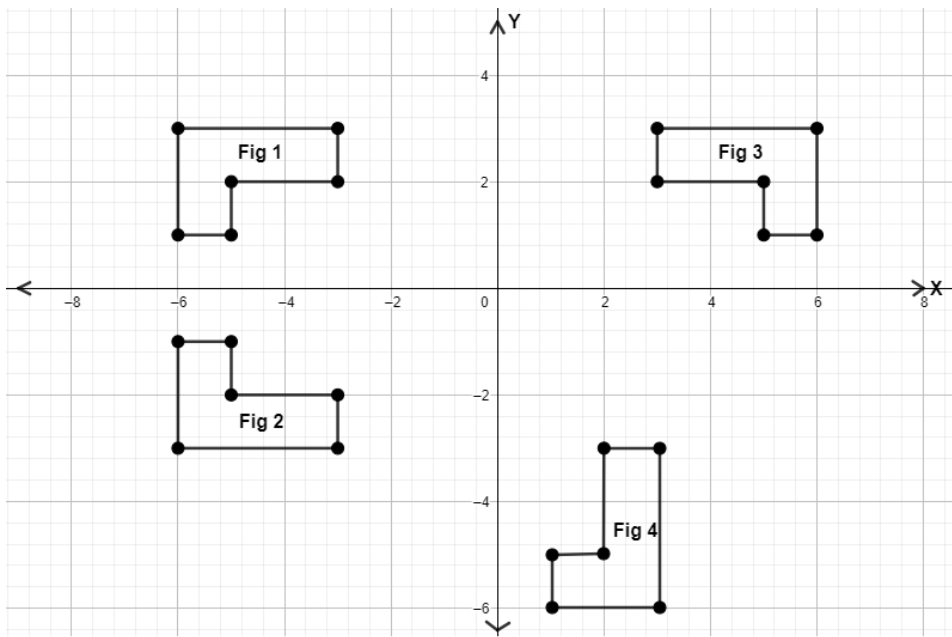
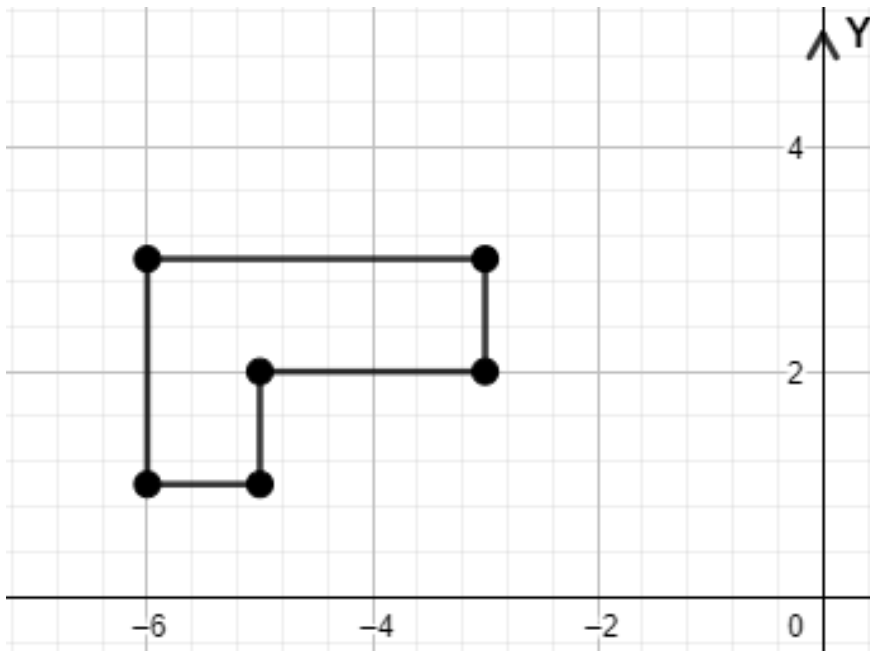
B  $(x; y) \rightarrow (-x; -y)$

C  $(x; y) \rightarrow (x; -y)$

D  $(x; y) \rightarrow (x; y)$

(1)

Consider the polygon below.



20. Which figure represents the reflection in the X-axis?

- A Fig 1
- B Fig 2
- C Fig 3
- D Fig 4

(1)

Given,  $X(2; 3)$ ,  $Y(-1; 4)$  and  $Z(-3; 0)$

21. Which coordinates describe the reflection in the X-axis?

A  $X'(-2; 3)$ ,  $Y'(1; 4)$ ,  $Z'(3; 0)$

B  $X'(3; 2)$ ,  $Y'(4; -1)$ ,  $Z'(0; -3)$

C  $X'(-2; -3)$ ,  $Y'(-1; -4)$ ,  $Z'(-3; 0)$

D  $X'(2; -3)$ ,  $Y'(-1; -4)$ ,  $Z'(-3; 0)$  (1)

22. What are the co-ordinates of B', the image of B(3 ; 2) after it is translated one unit downwards?

A (3 ; 3)

B (3 ; -2)

C (3 ; 1)

D (3 ; -1) (1)

23. What kind of transformation is described by the rule

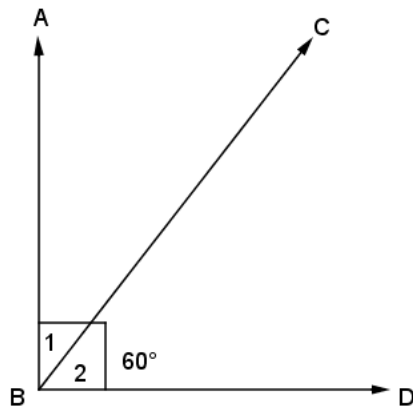
$$P(x; y) \rightarrow P'(x + 3; y - 5) ?$$

- A Translating the point three units up and five units downwards.
- B Translating the point three units down and five units upwards.
- C Translating the point three units to the right and five units downwards.
- D Translating the point three units to the left and five units upwards. (1)

Given  $Q(-10; 9)$

24. What are the coordinates of  $Q'$  using the rule  $(x; y) \rightarrow (x + 3; y - 2)$ ?

- A  $Q'(-13; 7)$
- B  $Q'(13; -7)$
- C  $Q'(-7; 11)$
- D  $Q'(-7; 7)$  (1)



25. What is the size of  $\widehat{B}_1$ ?

- A  $30^\circ$
- B  $60^\circ$
- C  $45^\circ$
- D  $90^\circ$

(1)

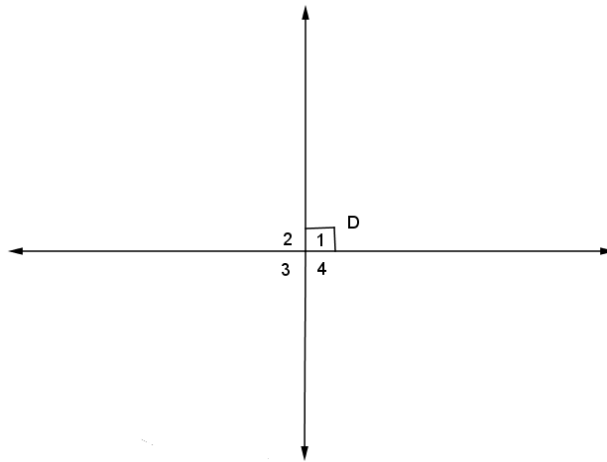
The sum of two adjacent angles is  $90^\circ$ .

26. What type of angles are these?

- A Complementary angles.
- B Supplementary angles.
- C Vertically opposite angles.
- D Angles around the point.

(1)

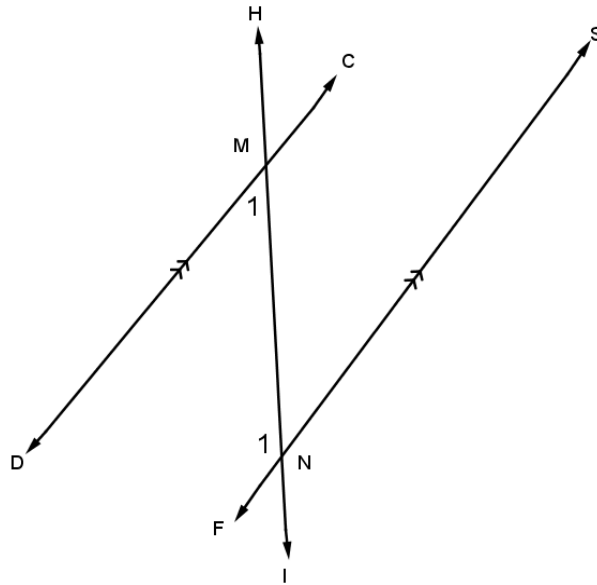




27. What is the size of  $\hat{D}$ ?

- A  $90^\circ$
- B  $180^\circ$
- C  $270^\circ$
- D  $360^\circ$

(1)

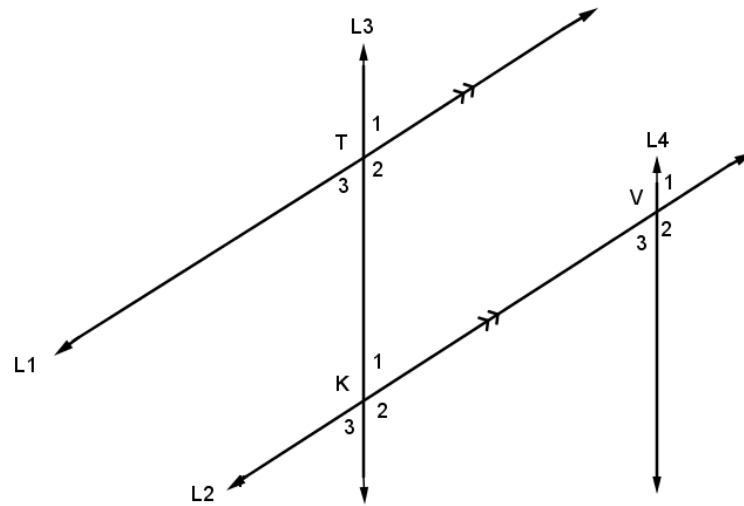


DE  $\parallel$  FG and cut by transversal line HI.

28. Why is  $\widehat{M}_1 + \widehat{N}_1 = 180^\circ$ ?

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

(1)

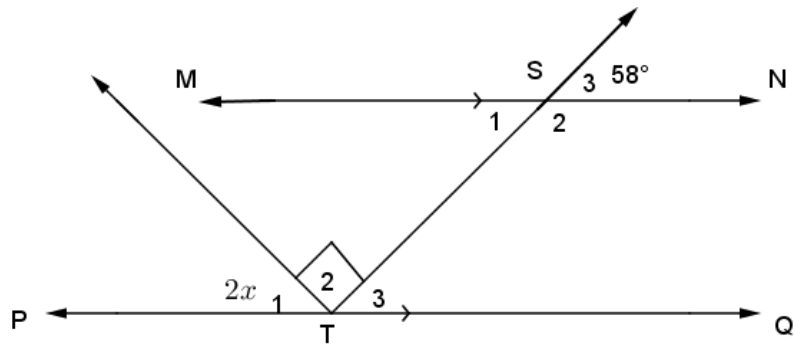


L1  $\parallel$  L2 cut by the transversal line L3.

29. Which angle is corresponding to  $\widehat{K}_1$ ?

- A  $\widehat{V}_1$
- B  $\widehat{T}_1$
- C  $\widehat{T}_3$
- D  $\widehat{K}_3$

(1)

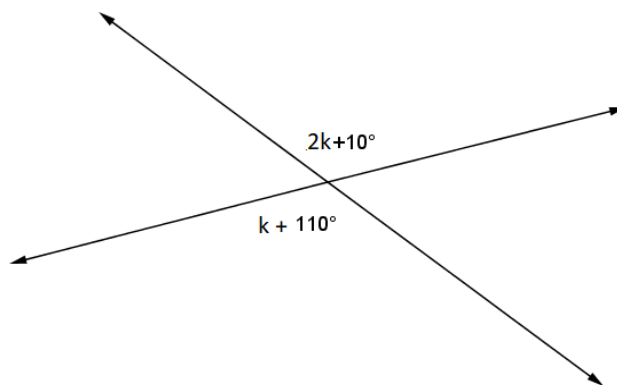


$MN \parallel PQ$ ,  $\hat{T}_1 = 2x$ ,  $\hat{T}_2 = 90^\circ$  and  $\hat{S}_3 = 58^\circ$

30. What is the value of  $x$ ?

- A  $58^\circ$
- B  $16^\circ$
- C  $32^\circ$
- D  $45^\circ$

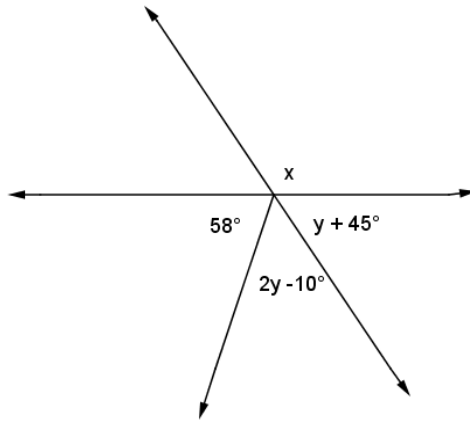
(1)



31. What is the value of  $k$ ?

- A  $110^\circ$
- B  $120^\circ$
- C  $100^\circ$
- D  $170^\circ$

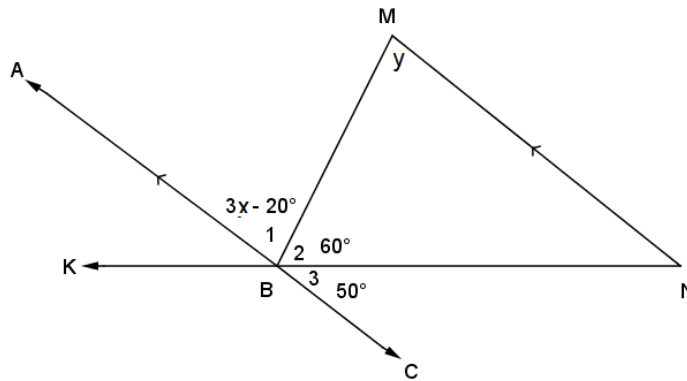
(1)



32. What is the value of  $x$ ?

- A  $106^\circ$
- B  $202^\circ$
- C  $58^\circ$
- D  $48^\circ$

(1)

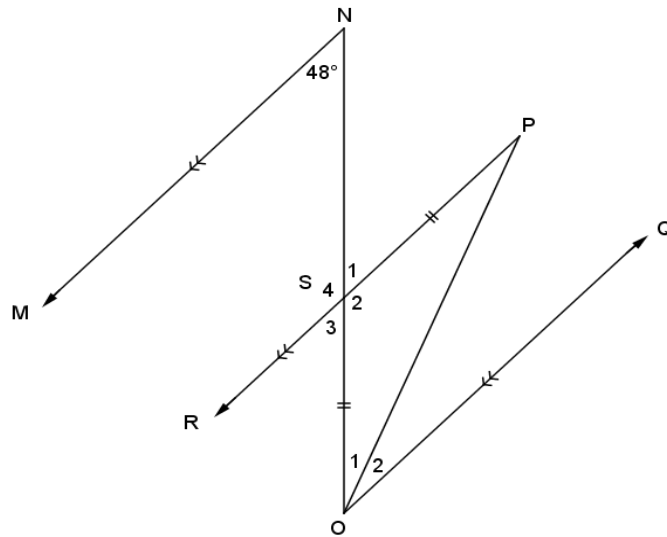


$AB \parallel MN, \hat{B}_1 = 3x - 20^\circ, \hat{B}_2 = 60^\circ, \hat{B}_3 = 50^\circ$  and  $\hat{M} = y$ .

33. What is the value of  $y$ ?

- A  $20^\circ$
- B  $70^\circ$
- C  $60^\circ$
- D  $50^\circ$

(1)

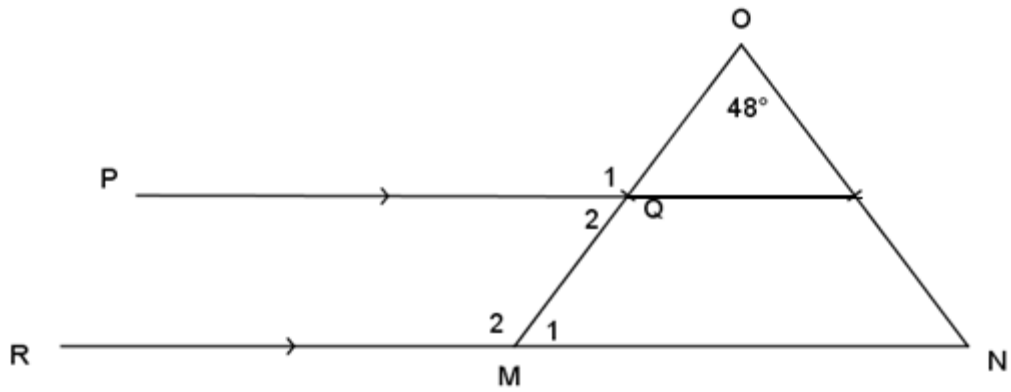


$MN \parallel RP \parallel OQ$ ,  $\hat{N} = 48^\circ$  and  $SO = SP$

34. What is the size of  $\hat{O}_2$  ?

- A  $66^\circ$
- B  $48^\circ$
- C  $24^\circ$
- D  $33^\circ$

(1)

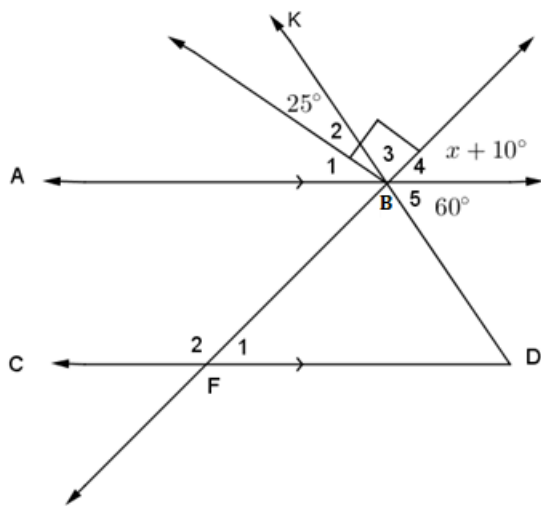


$PQ \parallel RN$ ,  $MO=NO$  and  $\hat{O} = 48^\circ$

35. What is the size of  $\hat{Q}_1$ ?

- A  $48^\circ$
- B  $66^\circ$
- C  $114^\circ$
- D  $132^\circ$

(1)



$AB \parallel CD$ ,  $\hat{B}_2 = 25^\circ$ ,  $\hat{B}_4 = x + 10^\circ$  and  $\hat{B}_5 = 60^\circ$

36. What is the size of  $\hat{F}_1$ ?

- A  $30^\circ$
- B  $55^\circ$
- C  $65^\circ$
- D  $60^\circ$

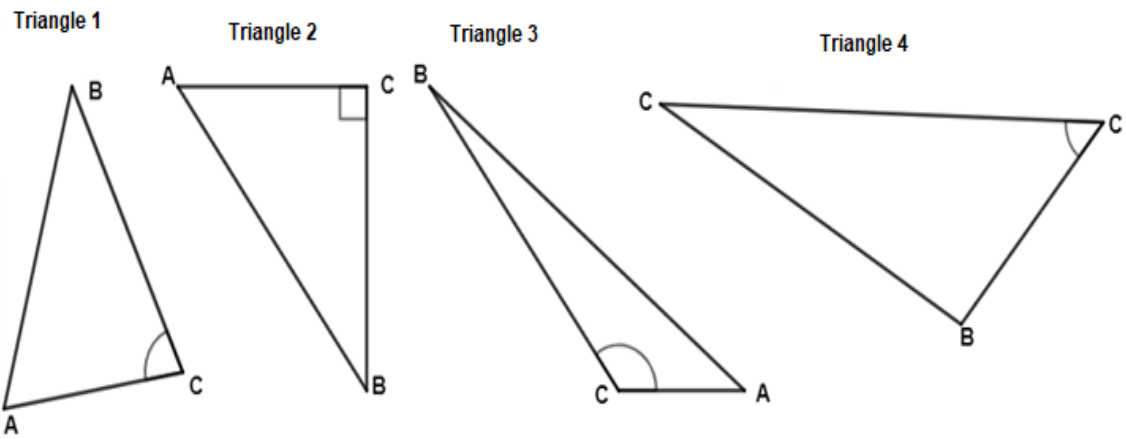
(1)

37. What type of a triangle is a triangle with all three angles equal?

- A A scalene triangle.
- B An isosceles triangle.
- C An equilateral triangle.
- D An equiangular triangle.

(1)



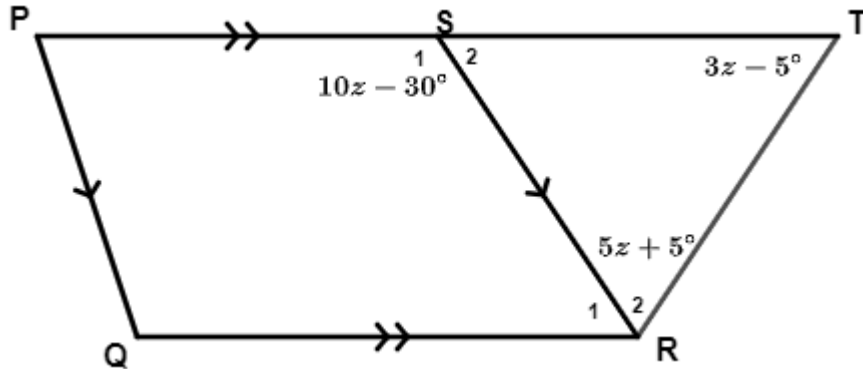


38. Which of the triangles is a right-angled triangle?

- A Triangle 1
- B Triangle 2
- C Triangle 3
- D Triangle 4

(1)

The diagram below shows rhombus PQRS with,  $\hat{S}_1 = 10z - 30^\circ$ ,  
 $\hat{R}_2 = 5z + 5^\circ$  and  $\hat{T} = 3z - 5^\circ$

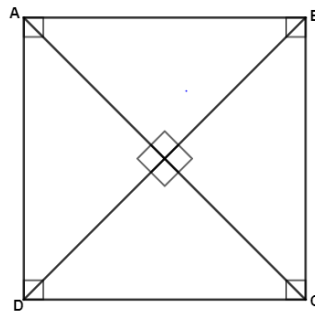


39. What is the value of  $\hat{P}$ ?

- A  $60^\circ$
- B  $15^\circ$
- C  $170^\circ$
- D  $110^\circ$

(1)

Quadrilateral ABCD is shown below.



40. What is ABCD?

- A A rhombus.
- B A parallelogram.
- C A rectangle.
- D A square.

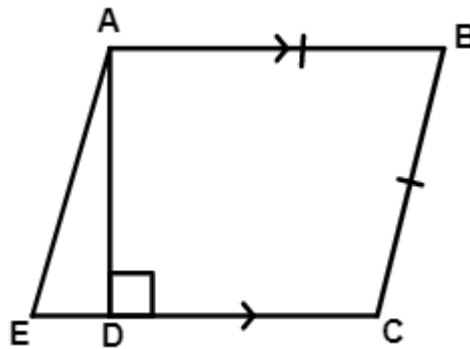
(1)

41. Which statement describes a parallelogram?

- A Diagonals bisect each other at  $90^\circ$ .
- B Diagonals bisect the angles at the vertices.
- C Diagonals bisect each other.
- D Diagonals are equal.

(1)

Given quadrilateral ABCE with  $AB \parallel CD$  and  $AB = BC$ .

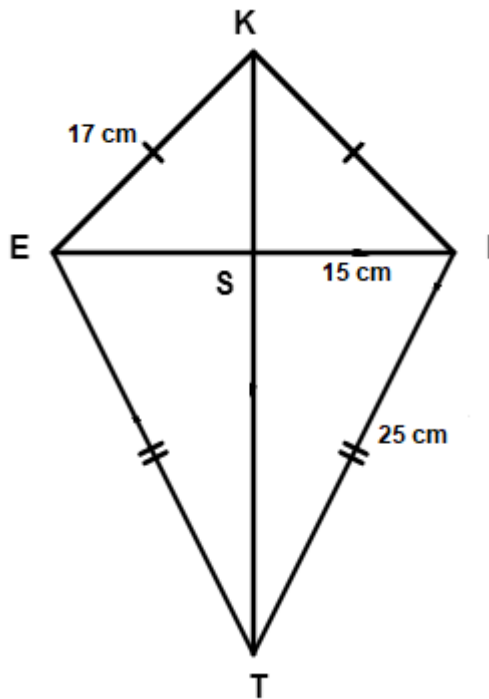


42. What is the shape ABCD called?

- A A parallelogram.
- B A square.
- C A trapezium.
- D A rhombus.

(1)

Given kite below, with  $KE=17$  cm,  $IT=25$  cm and  $SI=15$  cm.

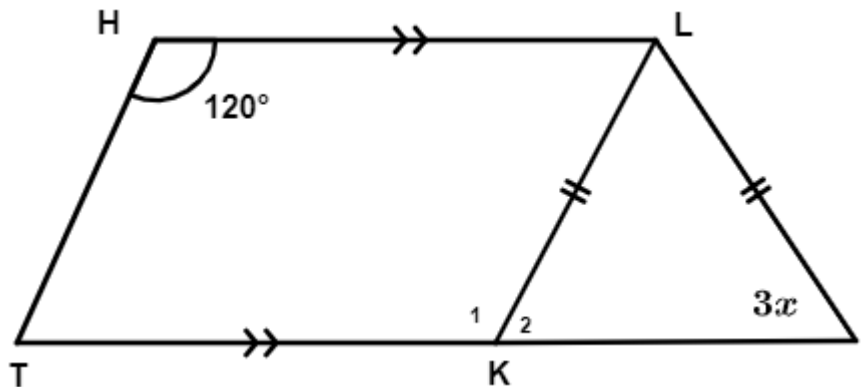


43. What is the length of diagonal  $KT$ ?

- A 42 cm.
- B 40 cm.
- C 20 cm.
- D 28 cm.

(1)

HTIL is a quadrilateral with parallelogram HTKL,  $\hat{H} = 120^\circ$ ,  $\Delta LKI$ ,  $\hat{I} = 3x$  and  $LK=LI$

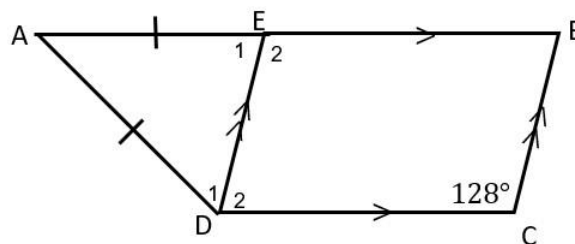


44. What is the value of  $x$  and what type of a triangle is  $\Delta IKL$ ?

- A  $x = 60^\circ$ ;  $\Delta IKL$  is an isosceles triangle.
- B  $x = 20^\circ$ ;  $\Delta IKL$  is an equilateral triangle.
- C  $x = 120^\circ$ ;  $\Delta IKL$  is an isosceles triangle.
- D  $x = 180^\circ$ ;  $\Delta IKL$  is an equilateral triangle.

(1)

Consider ADCB with  $\hat{C} = 128^\circ$  and  $\Delta AED$  with  $AE=AD$ .

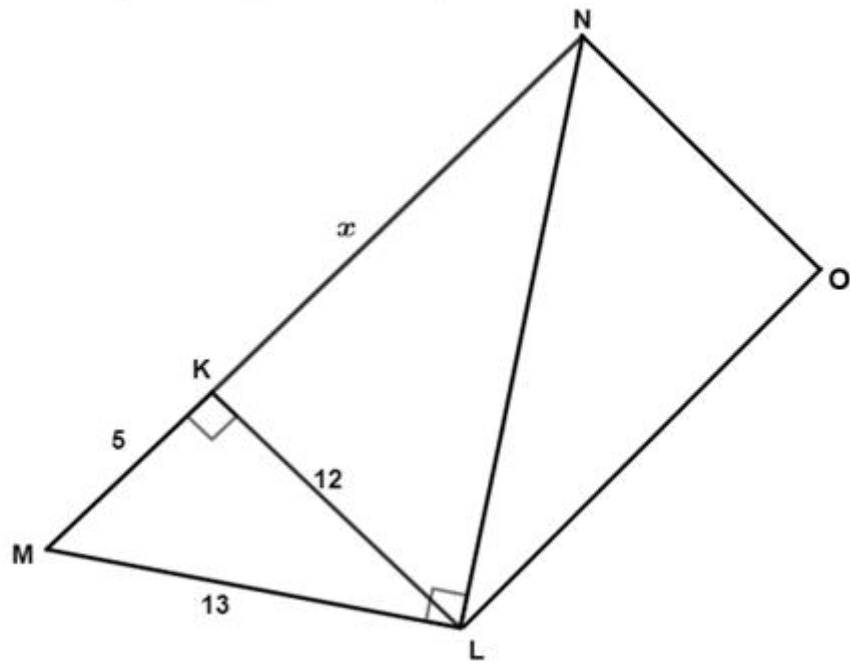


45. What is the size of  $\hat{A}$ ?

- A  $52^\circ$
- B  $104^\circ$
- C  $76^\circ$
- D  $128^\circ$

(1)

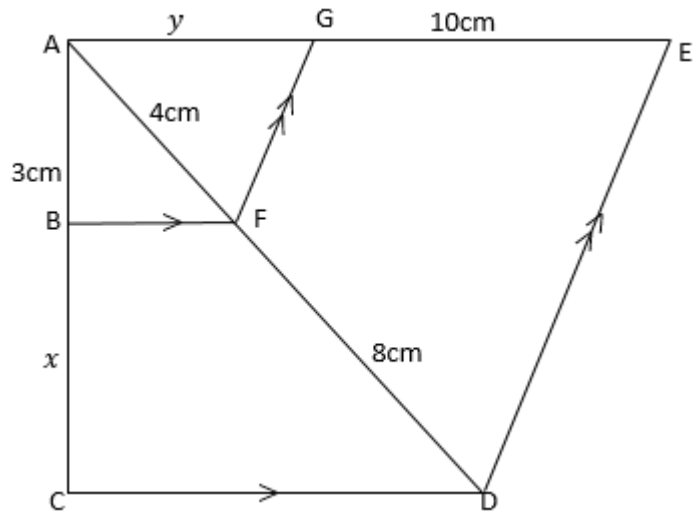
$\triangle MLN \sim \triangle MKL$ ,  $KL = 12$ ,  $ML = 13$ , and  $KM = 5$ ,  $LK = x$ .



46. What is the length of LN?

- A 26,2
- B 29,2
- C 31,2
- D 36,2

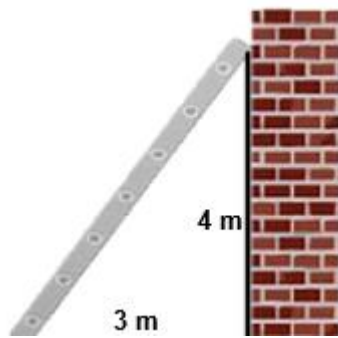
(1)



47. What is the value of  $x + y$ ?

- A 6 cm
- B 5 cm
- C 11 cm
- D 15 cm

(1)



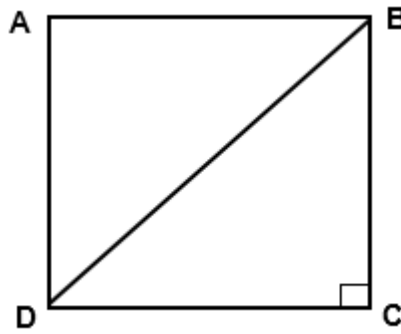
A ladder is placed at an angle against the wall. The ladder touches the wall 4 m from the ground. The bottom of the ladder is 3 m away from the wall.

48. What is the height of the ladder?

- A 1 m
- B 3 m
- C 4 m
- D 5 m

(1)

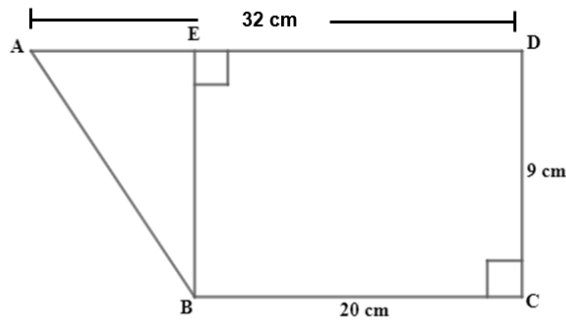
The square ABCD has an area of  $49 \text{ cm}^2$ .



49. What is the length of the diagonal of ABCD?

- A 7 cm
- B 49 cm
- C  $\sqrt{98}$  cm
- D  $\sqrt{14}$  cm

(1)



Quadrilateral BCDE with  $BC = 20 \text{ cm}$ ,  $CD = 9 \text{ cm}$  and  $AD = 32 \text{ cm}$  is shown above.

50. What is the length of AB?

- A 9 cm
- B 12 cm
- C 15 cm
- D 21 cm

(1)



Tom bought a dog's mat which is rectangular in shape.

The area of the mat is  $400 \text{ cm}^2$  and its length is 50 cm.

51. What is the breadth of the mat?

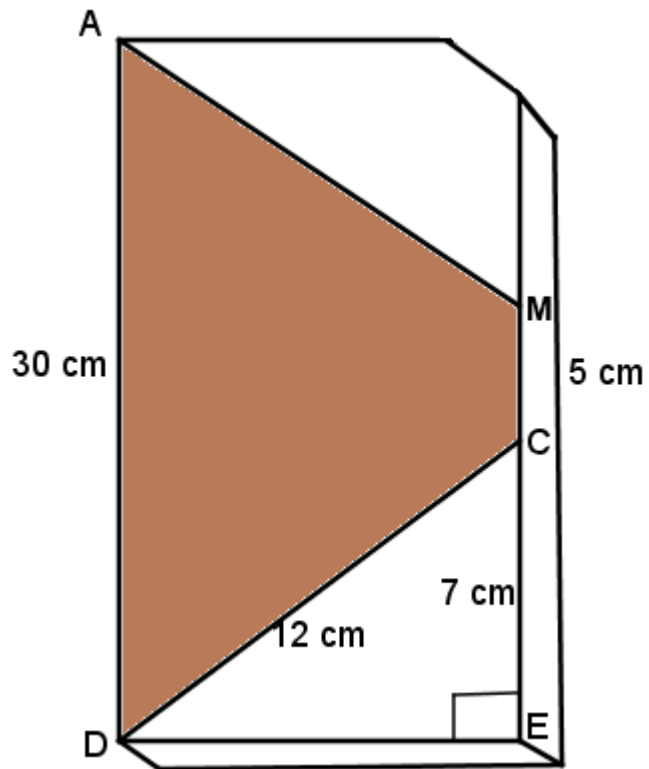
A 350 cm

B 8 cm

C 16 cm

D 450 cm

(1)



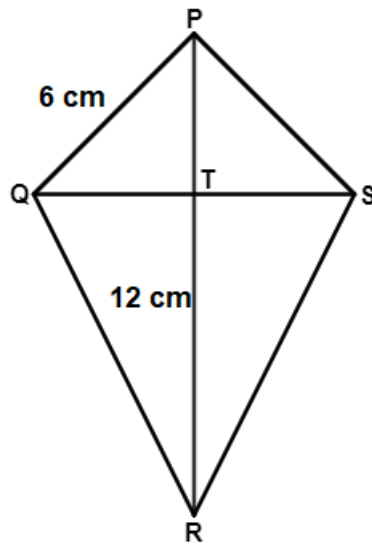
The diagram above shows a sketch of a book cover.

The book cover has shapes of a trapezium and triangle with dimensions  $AD = 30\text{ cm}$ ,  $CE = 7\text{ cm}$  and  $MC = 5\text{ cm}$ .

52. What is the area of the trapezium AMCD?

- A  $238,5\text{ cm}^2$
- B  $105\text{ cm}^2$
- C  $312\text{ cm}^2$
- D  $170,6\text{ cm}^2$

(1)



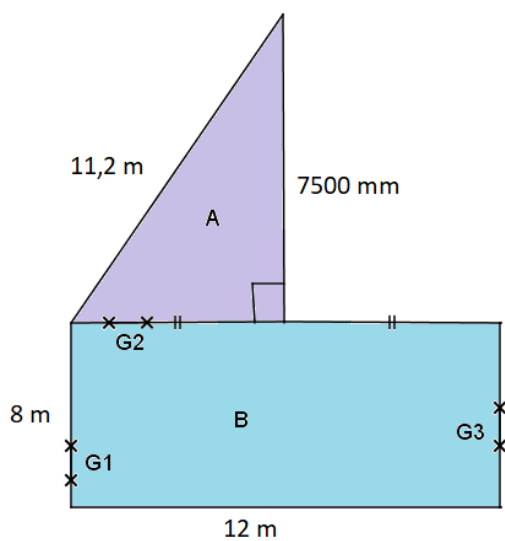
Given kite PQRS with  $PQ = 6 \text{ cm}$ ,  $TR = 12 \text{ cm}$  and  $QS = 10 \text{ cm}$ .

Change units

53. What is the perimeter of the kite?

- A 38 cm
- B 36 cm
- C 28 cm
- D 37 cm

(1)



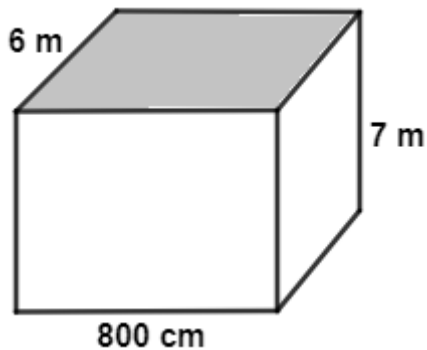
The chicken run is made up of a rectangular and a triangular shape.

The fence of the chicken run has gates G1, G2 and G3 which are 2 m each in length.

54.	What is the area and perimeter of the chicken run when all gates are removed?

A	Area=118.5 m <sup>2</sup> Perimeter= 57,2 m	
B	Area=45 096 m <sup>2</sup> Perimeter=58,7 m	
C	Area=118.5 m <sup>2</sup> Perimeter=48,7 m	
D	Area=22 596 m <sup>2</sup> Perimeter=52,7 m	(1)

A rectangular prism is opened on the shaded part. The breadth is 800 cm, width 6 m and height 7 m.

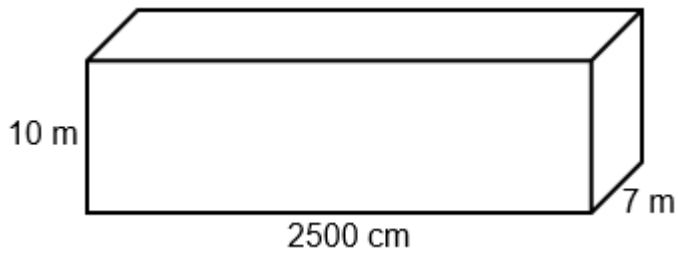


55. What is the surface area of the prism in m<sup>2</sup>?

- A 236 m<sup>2</sup>
- B 244 m<sup>2</sup>
- C 250 m<sup>2</sup>
- D 292 m<sup>2</sup>

(1)

A rectangular prism with length 2500 cm, height 10 m and breadth 7 m.

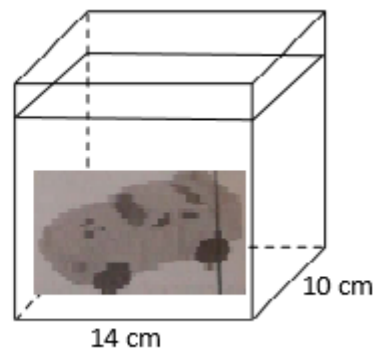
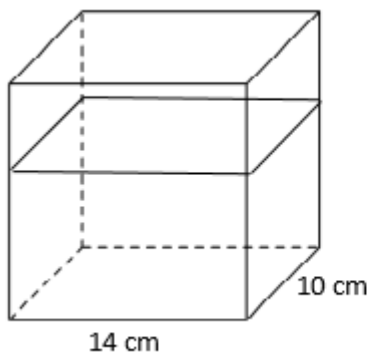


56. What is the volume of the object in  $\text{m}^3$ ?

- A  $175 \text{ m}^3$
- B  $1750 \text{ m}^3$
- C  $17500 \text{ m}^3$
- D  $175000 \text{ m}^3$

(1)

The height of water in a rectangular container is 16 cm. A toy car is placed in the water and the height of the water goes up to 19,5 cm.

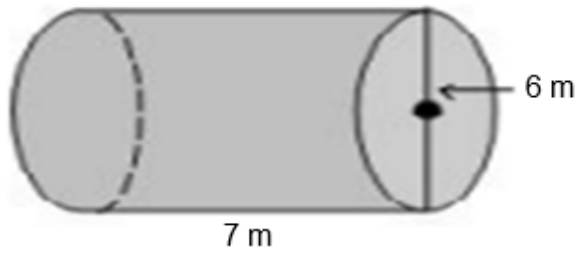


57. What is the volume of the toy car?

- A  $2730 \text{ cm}^3$
- B  $2240 \text{ cm}^3$
- C  $245 \text{ cm}^3$
- D  $490 \text{ cm}^3$

(1)

A cylindrical tube has a diameter of 6 m and a height of 7 m.



58. What is the surface area of the cylinder?

- A 188,5 m<sup>2</sup>
- B 490,1 m<sup>2</sup>
- C 150,8 m<sup>2</sup>
- D 301,6 m<sup>2</sup>

(1)

A water tank has a diameter of 600 cm and the surface area is 810,53 m<sup>2</sup>.

59. What is the height of the water tank in m?

- A 20,5 m
- B 15,5 m
- C 42 m
- D 40 m

(1)

A small cylindrical flu medicine bottle has the surface area of 31,5 cm<sup>2</sup>, with the height of 4 cm.

60. What is the radius of the bottle?

- A -1 cm
- B -5 cm
- C 1 cm
- D 5 cm

(1)

**[60]**

## SECTION B

°C	0	1	2		$m$
Day	2	4	6		12

The table shows the maximum temperatures measured during 12 days.

61.1 What is the value of  $m$ ?

(4)

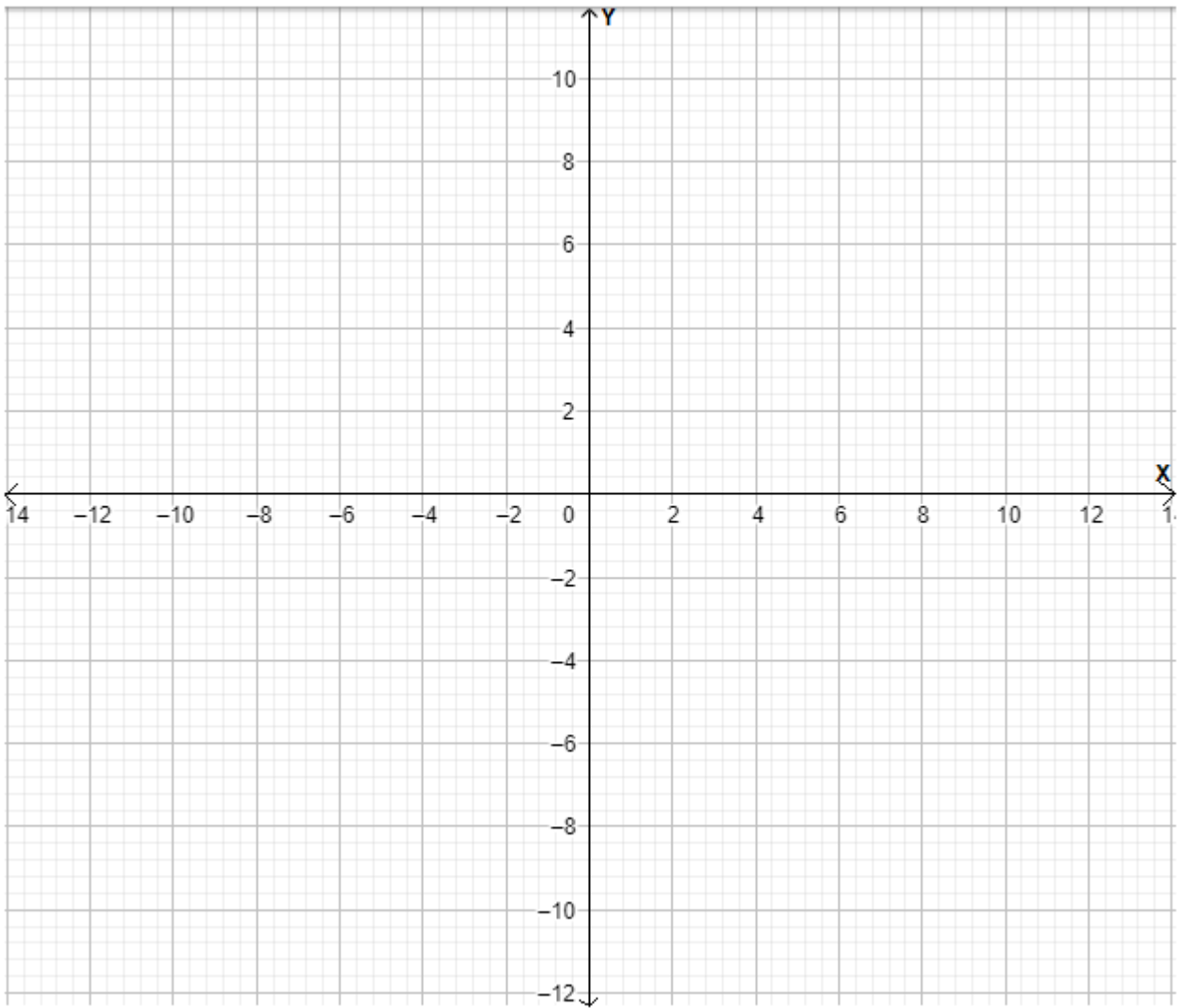
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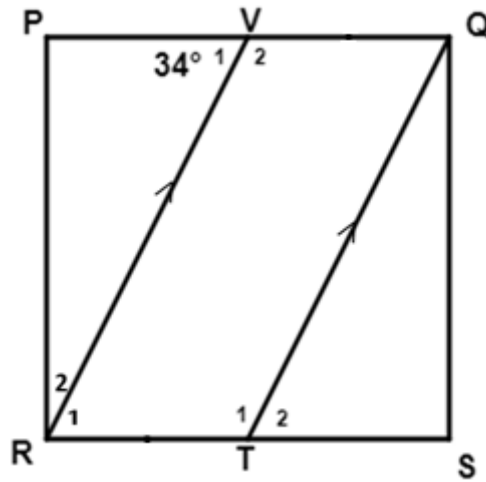
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61.2 Draw the graph illustrating the 4 days of the temperature taken.





PQRS is a square,  $VR \parallel TS$  and  $\hat{V}_1 = 34^\circ$ .



62. Prove  $\triangle PVR \cong \triangle STQ$ . (4)

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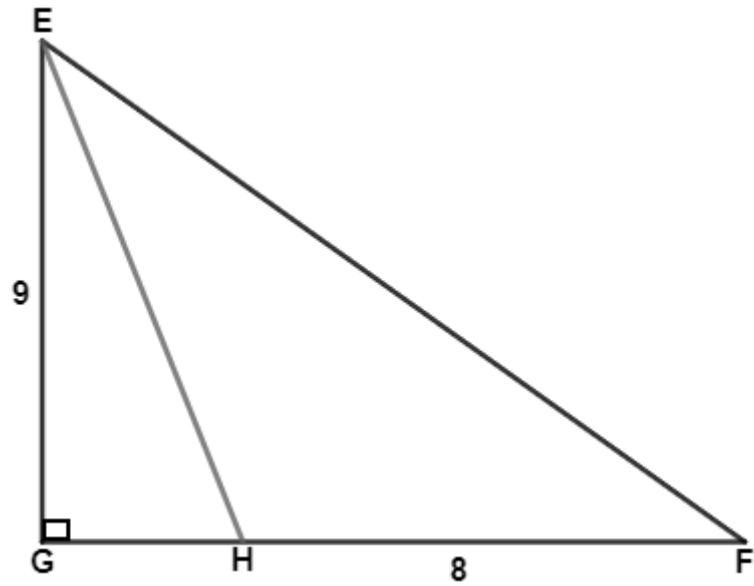
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The EFG is a right-angled triangle with  $EG=9$ ,  $EF = 15$  cm and  $HF = 8$  cm.

63. What is the length of EH? (5)

Give your answer correct to decimal places.

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64. What is the surface area of a cylindrical water pipe if its height is 900 cm (2)  
and the radius is 7 m? Use  $\pi = \frac{22}{7}$

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**[15]**