

Education and Manpower Bureau
Territory-wide System Assessment 2007
Secondary 3
Mathematics

Instructions:

1. There are 50 questions in this test.
2. Answer ALL questions.
3. Time allowed is 65 minutes.
4. Use of HKEAA approved calculators is allowed.
5. Write your answers in this Question-Answer booklet.

Section A: Mark your answers by putting a “✓” in the “○”, e.g.:

$$2 + 3 =$$

○ A. 4 ☒ B. 5 ○ C. 6 ○ D. 7

Section B: Write your answers in the spaces provided.

Section C: Write your mathematical expressions, answers and statements/conclusions in the spaces provided.

There is NO need to show your rough work.

6. Do your rough work on the rough work sheet provided.
7. Write your School Code, Class and Class Number in the boxes below.

School Code

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(5)

Class

3	
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Class No.

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(11)

↑
Write one capital letter in this box.

FORMULAS FOR REFERENCE

Sector	Arc length	$= 2\pi r \times \frac{\theta}{360^\circ}$
	Area	$= \pi r^2 \times \frac{\theta}{360^\circ}$
Sphere	Surface area	$= 4\pi r^2$
	Volume	$= \frac{4}{3}\pi r^3$
Cylinder	Curved surface area	$= 2\pi rh$
	Volume	$= \pi r^2 h$
Right circular cone	Curved surface area	$= \pi rl$
Circular cone	Volume	$= \frac{1}{3}\pi r^2 h$
Pyramid	Volume	$= \frac{1}{3} \times \text{base area} \times \text{height}$

The diagrams in this paper are not necessarily drawn to scale.

Marker's
Use Only

SECTION A : Mark your answers by putting a “✓” in the “○”.

1. Evaluate $-2 + 4(-1)$.

☐ A. -6 ☐ B. -2 ☐ C. 1 ☐ D. 6

(12)

2. Which of the following is correct?

☐ A. $\sqrt{120} < 11$ ☐ B. $\sqrt{121} < 11$

☐ C. $\sqrt{122} < 11$ ☐ D. $\sqrt{123} < 11$

(13)

3. Determine whether each of the following is factorization or expansion.

(i)	$3x + 6$ $= 3(x + 2)$
(ii)	$2(x + 2)$ $= 2x + 4$

☐ A. (i) Factorization (ii) Factorization

☐ B. (i) Factorization (ii) Expansion

☐ C. (i) Expansion (ii) Factorization

☐ D. (i) Expansion (ii) Expansion

(14)

4. The total weight of Kitty and Winnie is 60 kg. Kitty is 6 times as heavy as Winnie. Let x kg and y kg be the weights of Kitty and Winnie respectively. Which of the following pairs of simultaneous equations shows the relationships between x and y ?

☐ A. $\begin{cases} y = x + 60 \\ y = 6x \end{cases}$ ☐ B. $\begin{cases} x + y = 60 \\ y = 6x \end{cases}$

☐ C. $\begin{cases} x = y + 60 \\ x = 6y \end{cases}$ ☐ D. $\begin{cases} x + y = 60 \\ x = 6y \end{cases}$

(15)

5. Which of the following is an identity?

☐ A. $5(2+x) = 5(2-x)$

☐ B. $5x + 2x = 7x$

☐ C. $5(x+2) = 5x + 2$

☐ D. $5x + 2 = 7$

(16)

6. If $x \leq y$, which of the following must be correct?

☐ A. $x - 3 \geq y - 3$

☐ B. $x + 3 \geq y + 3$

☐ C. $\frac{x}{3} \geq \frac{y}{3}$

☐ D. $-3x \geq -3y$

(17)

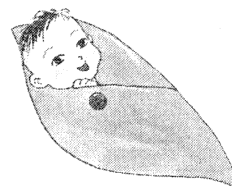
7. The body length of a baby is measured to be 50 cm correct to the nearest cm. Which of the following is the range of its actual body length?

☐ A. 45 cm to 55 cm

☐ B. 49 cm to 51 cm

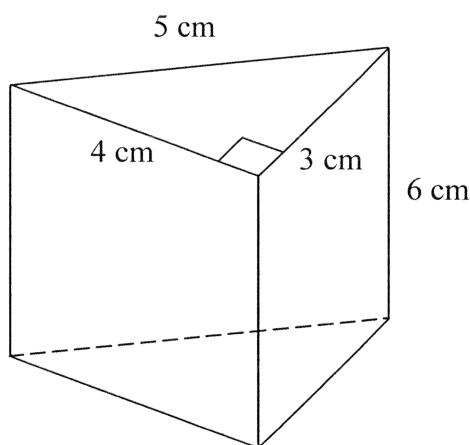
☐ C. 49.5 cm to 50.5 cm

☐ D. 49.95 cm to 50.05 cm



(18)

8. The figure shows a solid prism. Its base is a right-angled triangle. Find its surface area.



☐ A. 36 cm^2

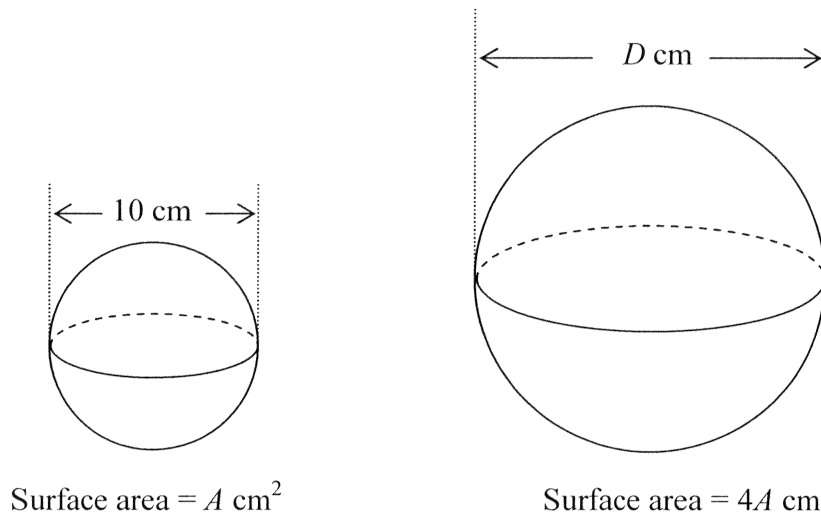
☐ B. 72 cm^2

☐ C. 78 cm^2

☐ D. 84 cm^2

(19)

9.



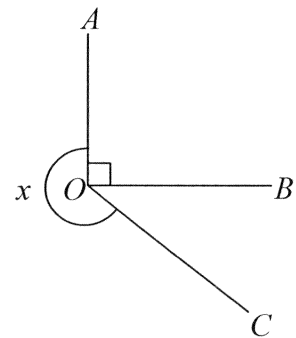
The figure above shows two spheres of surface areas $A \text{ cm}^2$ and $4A \text{ cm}^2$ respectively. The diameter of the small sphere is 10 cm and the diameter of the large sphere is $D \text{ cm}$. The value of D is

- ☐ A. 20 . ☐ B. 40 .
☐ C. 80 . ☐ D. 160 .

(20)

10. Refer to the figure. AO , BO and CO are straight lines.
 x is

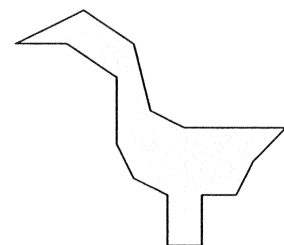
- ☐ A. an acute angle. ☐ B. an obtuse angle.
☐ C. a reflex angle. ☐ D. a straight angle.



(21)

11. What will happen to the size and shape of the figure under reflection?

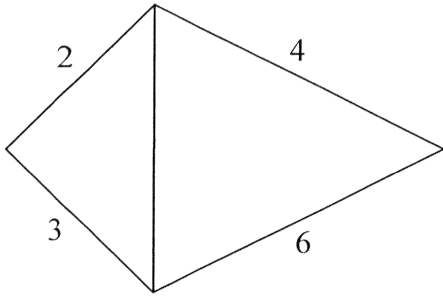
- | <u>Size</u> | <u>Shape</u> |
|--------------------------------------|--------------|
| <input type="radio"/> A. changed | changed |
| <input type="radio"/> B. changed | not changed |
| <input type="radio"/> C. not changed | changed |
| <input type="radio"/> D. not changed | not changed |



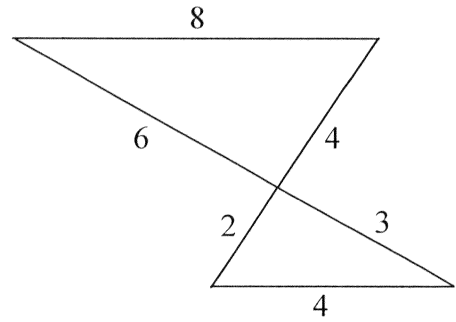
(22)

12. Which of the following figures shows two similar triangles?

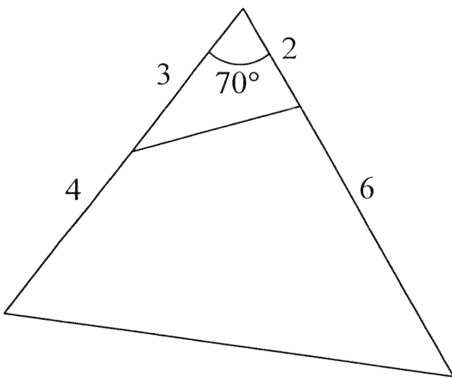
☐ A.



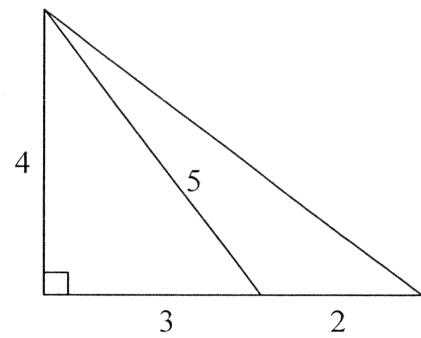
☐ B.



☐ C.



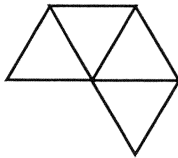
☐ D.



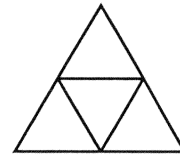
(23)

13. Which of the following nets can be folded into a regular tetrahedron?

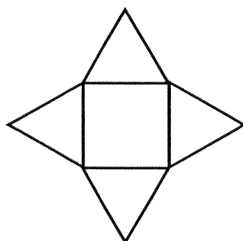
☐ A.



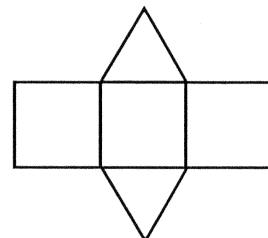
☐ B.



☐ C.

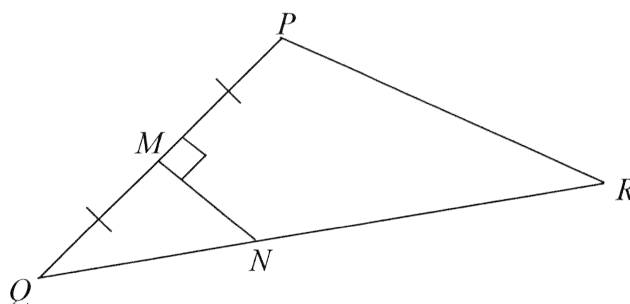


☐ D.



(24)

14. The following figure shows $\triangle PQR$ where $MN \perp PQ$ and $PM = MQ$.

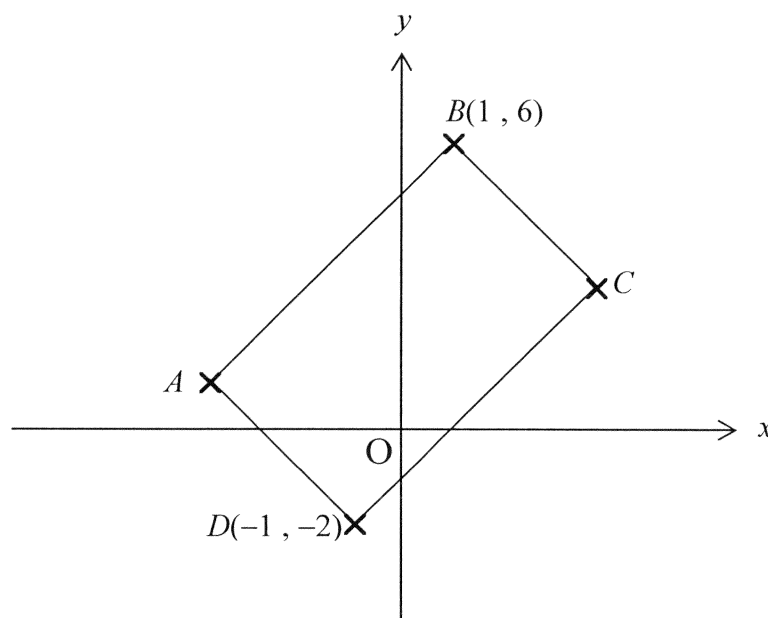


MN is

- ☐ A. an altitude of $\triangle PQR$.
 ☐ B. an angle bisector of $\triangle PQR$.
 ☐ C. a median of $\triangle PQR$.
 ☐ D. a perpendicular bisector of $\triangle PQR$.

(25)

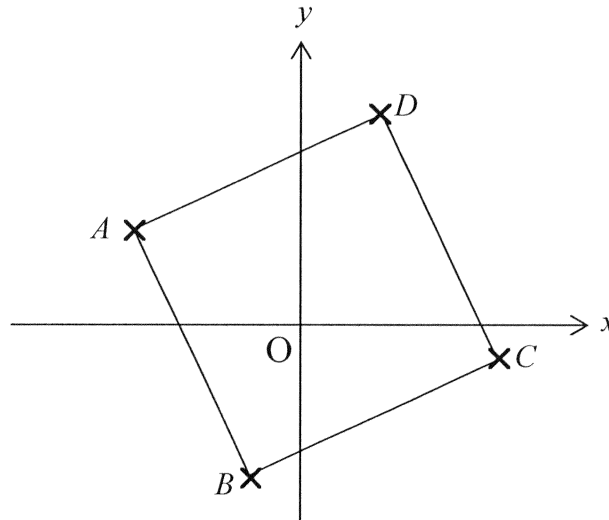
15. The figure below shows a rectangle $ABCD$. Find the length of the diagonal BD of the rectangle.



- ☐ A. $\sqrt{[1 - (-1)] + [6 - (-2)]}$ units
☐ B. $\sqrt{[1 + (-1)] + [6 + (-2)]}$ units
☐ C. $\sqrt{[1 - (-1)]^2 + [6 - (-2)]^2}$ units
☐ D. $\sqrt{[1 + (-1)]^2 + [6 + (-2)]^2}$ units

(26)

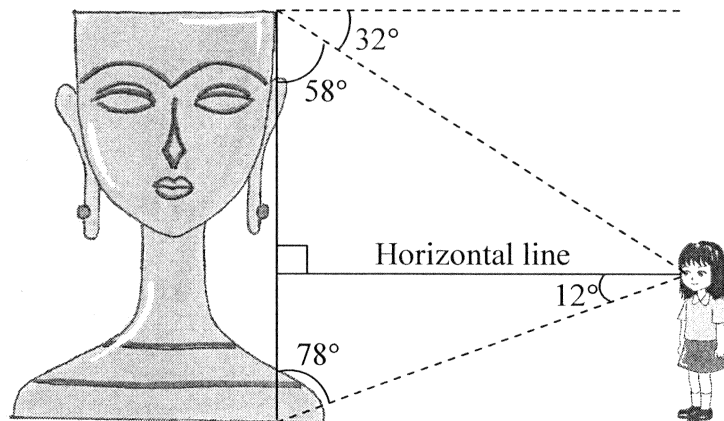
16. The figure below shows a square $ABCD$. The slope of AB is -2 . Find the slopes of BC and CD .



- | | <u>Slope of BC</u> | <u>Slope of CD</u> |
|--------------------------|---------------------------------|---------------------------------|
| <input type="radio"/> A. | -2 | -2 |
| <input type="radio"/> B. | -2 | $\frac{1}{2}$ |
| <input type="radio"/> C. | $\frac{1}{2}$ | -2 |
| <input type="radio"/> D. | $\frac{1}{2}$ | $\frac{1}{2}$ |

(27)

17.

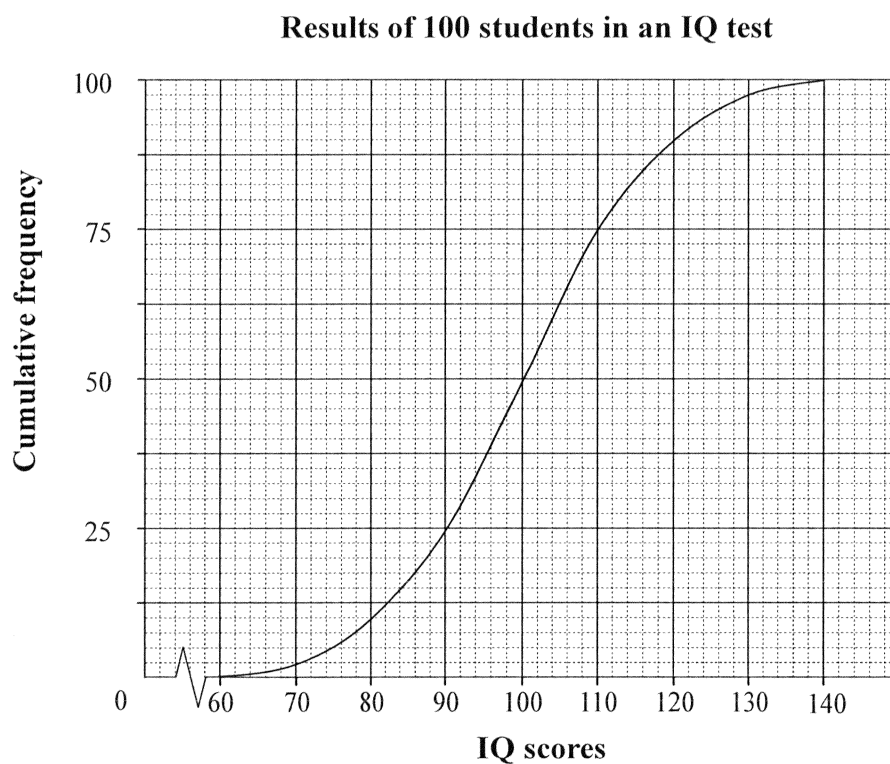


In the figure, the angle of elevation of the top of the statue from the girl is

- ☐ A. 12° . ☐ B. 32° . ☐ C. 58° . ☐ D. 78° .

(28)

18. The following cumulative frequency curve shows the results of 100 students in an IQ test.



The upper quartile of the IQ scores is

- ☐ A. 75.
 ☐ B. 90.
 ☐ C. 100.
 ☐ D. 110.

(29)

19. Find the mode of the following data:

2, 2, 2, 5, 5, 6, 9, 10, 13

- ☐ A. 2
 ☐ B. 3
 ☐ C. 5
 ☐ D. 6

(30)

SECTION B : Write down your answers in the spaces provided.

20. The security guards of Candy Mall use positive numbers, negative numbers and zero to represent their positions on patrol. For example: +5 stands for five floors above the Ground Floor.

Use suitable numbers to represent the following positions of the guards:

Floor		Answer
Example:	Five floors above the Ground Floor	+5
(i)	Three floors above the Ground Floor	(i) _____
(ii)	Ground Floor	(ii) _____
(iii)	Two floors below the Ground Floor	(iii) _____

1 mark (31)

21. Use scientific notation to represent 120 000.

Answer : 120 000 = _____

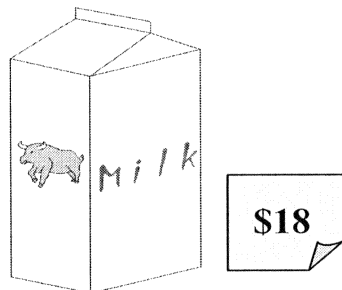
1 mark (32)

22. Determine whether a rate or a ratio should be used to relate the quantities in each of the following statements.

Statement	*Circle the answer
(i) Tom finished a rectangular puzzle of length 16 cm and width 9 cm.	(i)* Rate / Ratio
(ii) Mary bought 5 kg of rice for \$32.5.	(ii)* Rate / Ratio

1 mark (33)


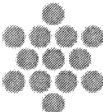
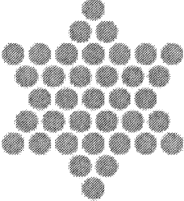
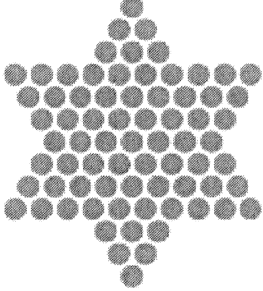
- 23.



In a supermarket, the price of milk is \$18 per box. Mary has given the shop assistant \$100 to pay for x boxes of milk. The shop assistant should return \$ (_____) to Mary.

1 mark (34)

24. The first four figures formed by beads are shown below.

	Figure 1	Figure 2	Figure 3	Figure 4
				
Number of beads	1	13	37	73

The number of beads in the n^{th} figure is $6n(n-1)+1$.

The number of beads in the 10^{th} figure is _____.

1 mark (35)

25. Find the coefficient of x^3 in the polynomial $-7-4x^2+x^3$.

Answer : _____

1 mark (36)

26. Simplify $(9xy-2y)-(5xy+y)$.

Answer : $(9xy-2y)-(5xy+y) =$ _____

1 mark (37)

27. Simplify $\frac{(x^4)^2}{x^2}$.

Answer : $\frac{(x^4)^2}{x^2} =$ _____

1 mark (38)

28. Factorize $9x^2+6x+1$.

Answer : $9x^2+6x+1 =$ _____

1 mark (39)

29. Solve $2x-6x=8$.

Answer : $x =$ _____

1 mark (40)

30. The cost (\$ C) of a toy bear is given by the formula

$$C = 40 + \frac{300}{n}, \text{ where } n \text{ is the number of toy bears produced.}$$

If $n = 150$, find the value of C .

Answer : $C =$ _____



1 mark (41)

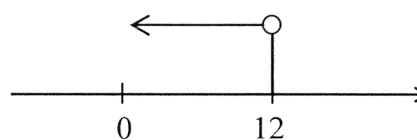
31. Simplify $\frac{12x}{y} + \frac{3xy}{y^2}$.

Answer : $\frac{12x}{y} + \frac{3xy}{y^2} =$ _____

1 mark (42)

32. According to the diagram, write down an inequality in x .

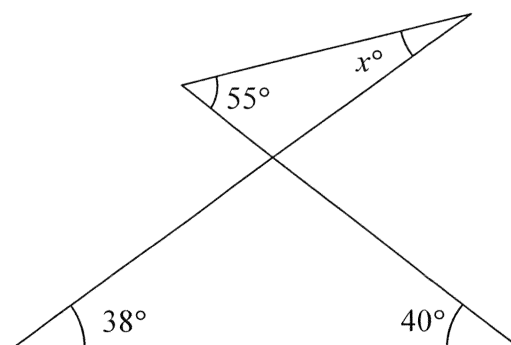
Answer : _____



1 mark (43)

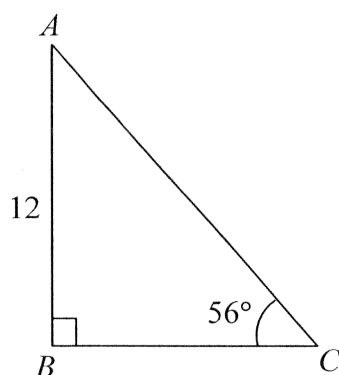
33. Refer to the figure. Find the value of x .

Answer : $x =$ _____



1 mark (44)

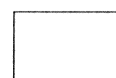
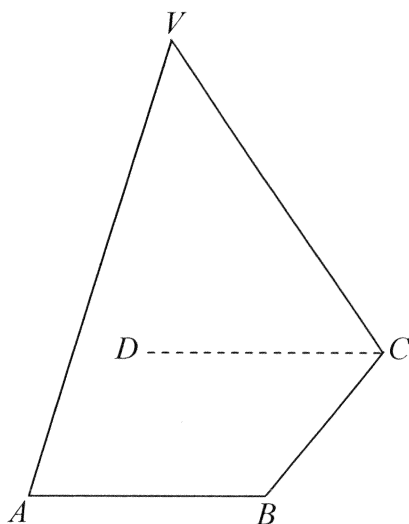
- 34.



In the figure, $BC =$ _____ (correct to 1 decimal place)

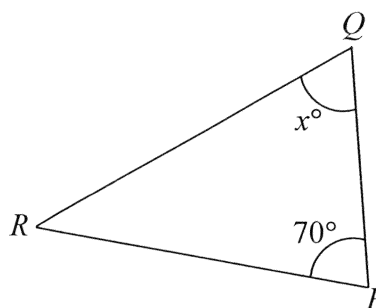
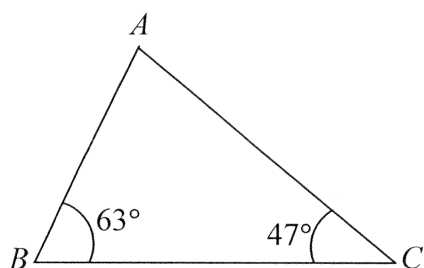
1 mark (45)

35. Add straight lines to the following diagram to form the picture of a pyramid with square base. (Draw one solid line from point V and two dotted lines from point D .)



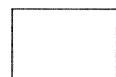
1 mark (46)

36.



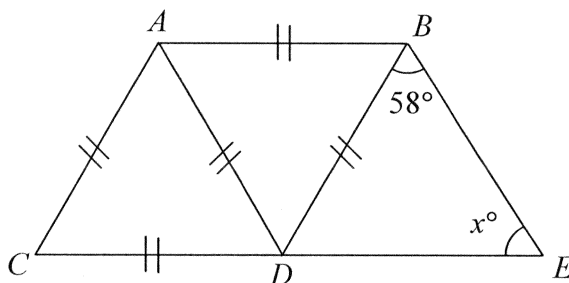
Given that $\triangle ABC \cong \triangle PQR$. Find the value of x .

Answer : $x =$ _____



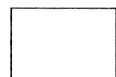
1 mark (47)

37.



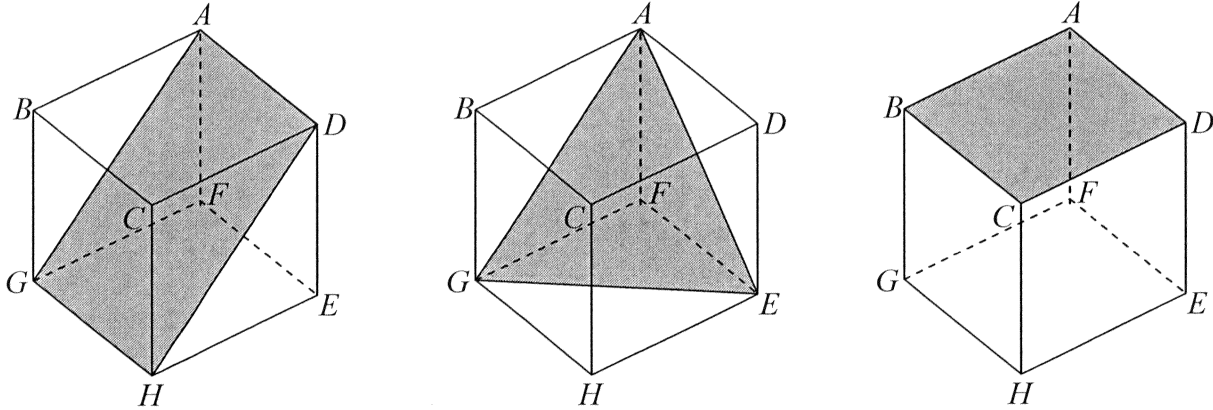
In the above figure, $\triangle ACD$ and $\triangle ABD$ are equilateral triangles. CDE is a straight line. Find the value of x .

Answer : $x =$ _____



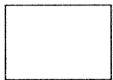
1 mark (48)

38.



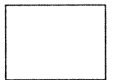
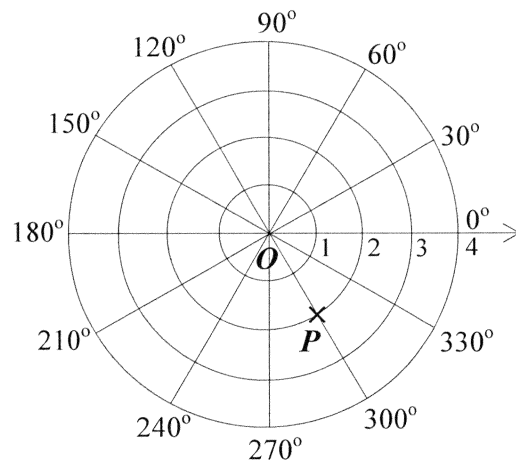
One of the shaded planes in the above cubes is a plane of reflectional symmetry.
Name that plane of reflectional symmetry of the cube.

Answer : _____



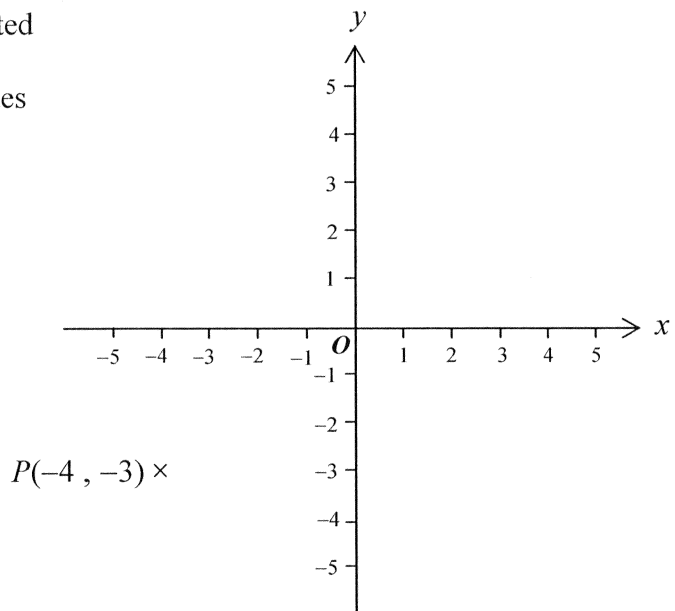
1 mark (49)

39. In the polar coordinate plane, the polar coordinates of P are (_____ , _____).



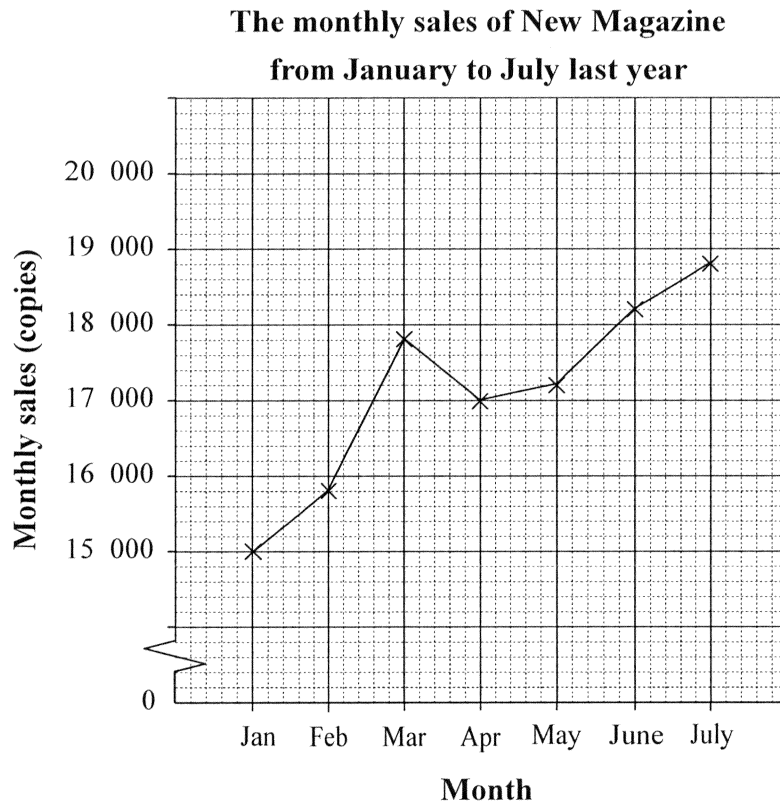
1 mark (50)

40. In the figure, point $P(-4, -3)$ is reflected in the y -axis to point P' . The coordinates of P' are (_____ , _____).



1 mark (51)

41. The following broken line graph shows the monthly sales of New Magazine from January to July last year.



- (a) In which month were the monthly sales of New Magazine over 18 500 copies?

Answer : The monthly sales were over 18 500 copies in _____ .

1 mark (52)

- (b) What was the difference in monthly sales of New Magazine between June and July?

Answer : The difference in monthly sales was _____ copies.

1 mark (53)

- (c) Which month had the largest increase in monthly sales compared to the previous month?

Answer : _____ had the largest increase in monthly sales compared to the previous month.

1 mark (54)

42. The table below shows the results of Super Team in 10 matches of the District Football League and the points gained per match.

Result	Win	Draw	Lose
Number of matches	4	4	2
Points gained per match	3	1	0

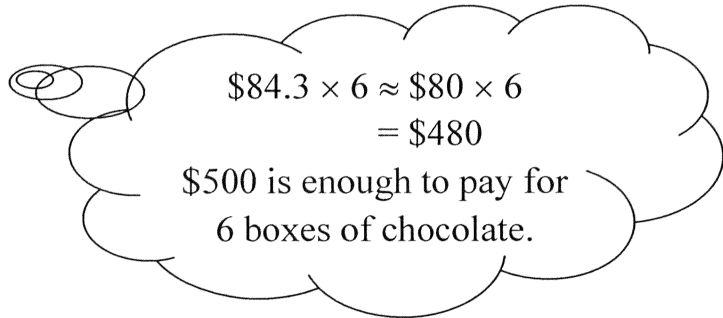
With the number of matches as the weight, find the weighted mean of the points gained per match by Super Team.

Answer : The weighted mean of the points gained per match is _____ .

1 mark (55)

SECTION C: Write your mathematical expressions, answers and statements/conclusions in the spaces provided.
There is **NO** need to show your rough work.

43. Carl had \$500 and wanted to buy 6 boxes of chocolate that cost \$ 84.3 each. He estimated the total cost.

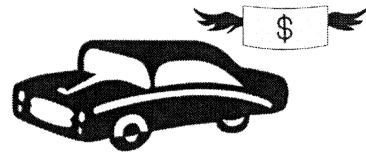


Without actual calculations, judge whether Carl's result of estimation is reasonable. Explain why you agree or disagree with Carl.

1 mark (56)

1 mark (57)

44. Henry bought a car for \$120 000 three years ago. Its value decreases by 15% each year. Find the present value of the car.



(Show your working)

1 mark (58)

1 mark (59)

1 mark (60)

45. Solve the simultaneous equations $\begin{cases} x = 2y \\ x - y + 3 = 0 \end{cases}$.

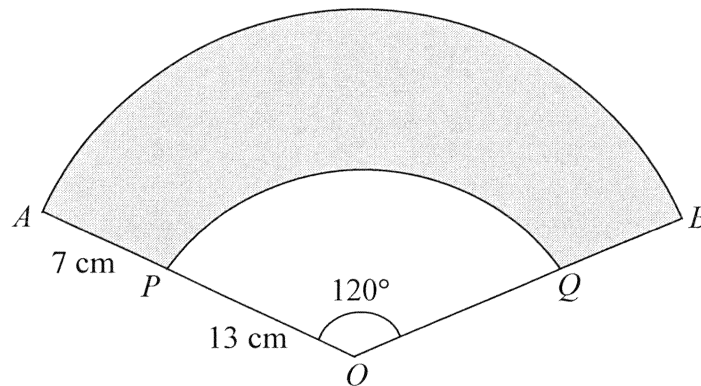
(Show your working)

1 mark (61)

1 mark (62)

1 mark (63)

- 46.



In the above figure, sector OPQ is cut away from the large sector OAB . The angle between the radii OPA and OQB is 120° . The lengths of OP and PA are 13 cm and 7 cm respectively. Find the area of the remaining part $ABQP$ correct to 1 decimal place.

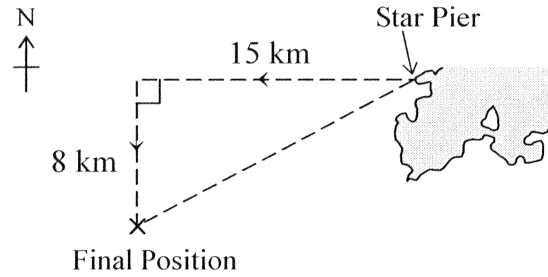
(Show your working)

1 mark (64)

1 mark (65)

1 mark (66)

47. A boat sailed 15 km due West and then 8 km due South. Find the distance between the final position of the boat and Star Pier.



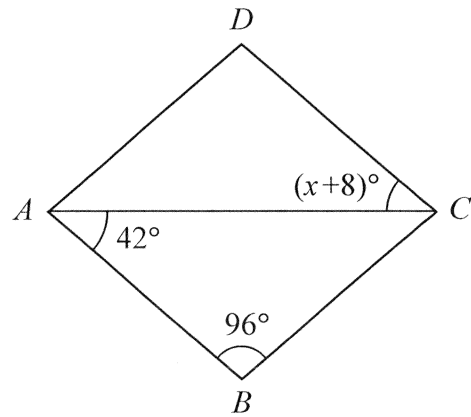
(Show your working)

1 mark (67)

1 mark (68)

1 mark (69)

48. $ABCD$ is a rhombus. Find the value of x .



(Show your working)

1 mark (70)

1 mark (71)

49. The heights (in cm) of 20 patients were recorded by a nurse as follows:

162	55	138	155	92
86	137	112	70	81
132	164	169	118	130
88	120	190	151	189

Complete the following two frequency distribution tables.

Table 1

Height (cm)	Tally	Frequency
51 – 100		
101 – 150		
151 – 200		

1 mark (72)

Table 2

Height (cm)	Tally	Frequency
51 – 80		
81 – 110		
111 – 140		
141 – 170		
171 – 200		

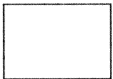
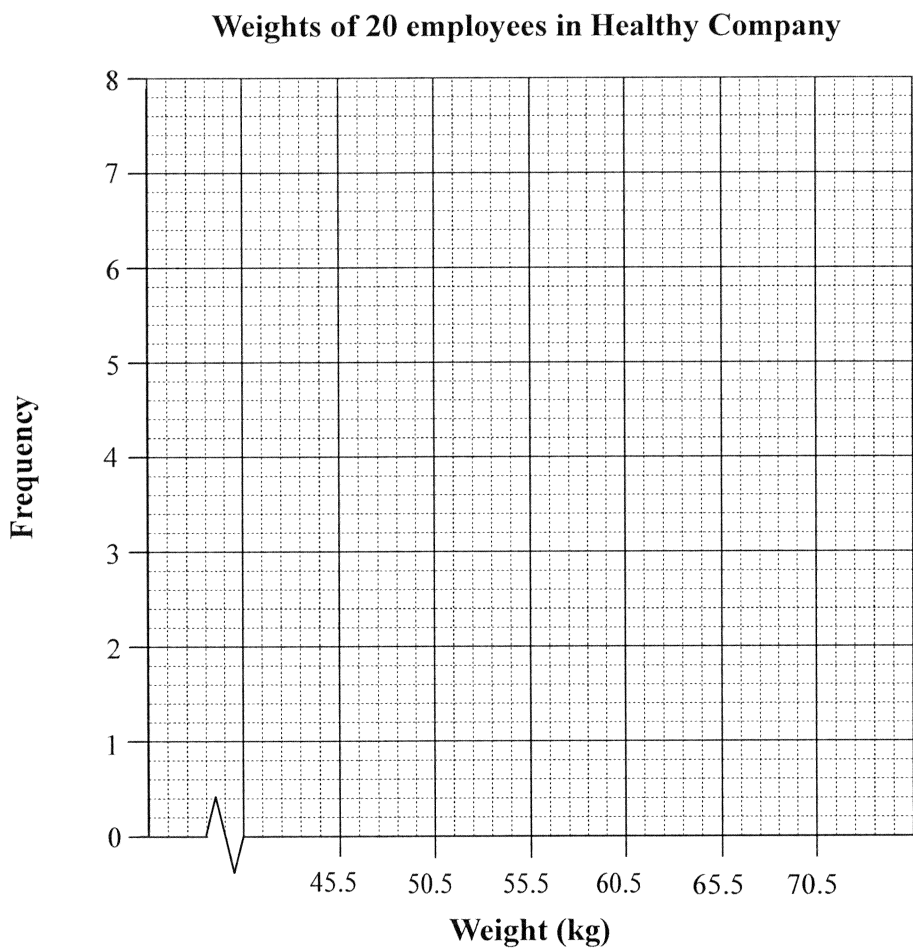
1 mark (73)

1 mark (74)

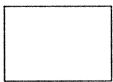
50. The following frequency distribution table shows the weights of 20 employees in Healthy Company.

Weight (kg)	Frequency
46 – 50	2
51 – 55	4
56 – 60	6
61 – 65	5
66 – 70	3

Draw a frequency polygon to represent the data.



1 mark (75)



1 mark (76)

END OF PAPER