9	M	E	1	(	Q	)

Education Bureau

Territory-wide System Assessment 2019

Secondary 3 Mathematics

QUESTION BOOKLET

INSTRUCTIONS

1. There are 47 questions in this paper.
2. The time allowed is 65 minutes.
3. Answer ALL questions in the separate ANSWER BOOKLET.
4. The use of HKEAA approved calculators is permitted.
5. Unless otherwise specified, numerical answers should be either exact or correct to 3 significant figures.
6. Rough work should be done on the rough work sheet provided.
7. The diagrams in this paper are not necessarily drawn to scale.

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	=	$\pi r^2 h$
Cone	Curved surface area	=	πrl
	Volume	=	$\frac{1}{3}\pi r^2 h$
Prism	Volume	=	base area × height
Pyramid	Volume	=	$\frac{1}{3}$ × base area × height

SECTION A: Choose the best answer for each question.
You should mark all your answers in the ANSWER BOOKLET.

1. Jenny multiplied a two-digit number by a two-digit number. Her work was made dirty accidentally. Which of the following **CANNOT** be the product?

$$\begin{array}{r} 3\blacksquare \\ \times\ \ 4\,0 \\ \hline 1\blacksquare\blacksquare \end{array}$$

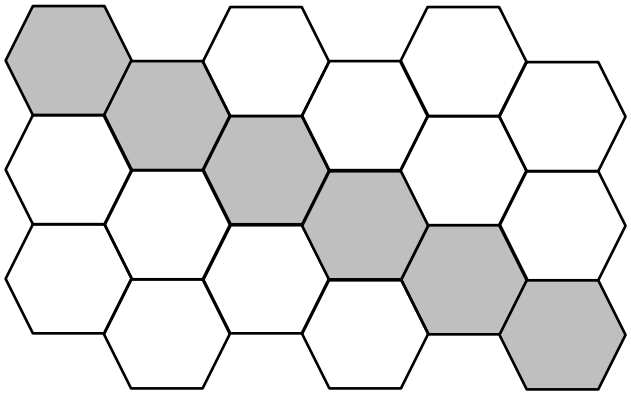
A. 1 160

B. 1 240

C. 1 400

D. 1 560

2.



In the figure, there are 18 identical hexagons and 6 of them are shaded. Find the ratio of the number of shaded hexagons to the number of hexagons in white.

A. 1 : 2

B. 1 : 3

C. 2 : 1

D. 2 : 3

3. $-y^2+(-y)^2=$

A. 0.
B. $2y^2$.
C. $-2y^2$.
D. y^4.

4. Simplify $\frac{(b^5)^2}{b^3}$.

A. b^{22}
B. b^{13}
C. b^7
D. b^4

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

(i)	$(2x+1)(x+2)(x-3)$ $=2x^3-x^2-13x-6$
(ii)	$2x^3-x^2-13x-6$ $=(2x+1)(x+2)(x-3)$

A. (i) Expansion (ii) Factorization
B. (i) Expansion (ii) Expansion
C. (i) Factorization (ii) Factorization
D. (i) Factorization (ii) Expansion

6. David spends \$41 to buy 2 rulers and 3 pencils. Bowie spends \$92 to buy 5 rulers and 6 pencils. It is given that the prices of a ruler and a pencil are $\$x$ and $\$y$ respectively. Which of the following pairs of simultaneous equations shows the relation between x and y?

A. $\begin{cases} 3x + 2y = 41 \\ 6x + 5y = 92 \end{cases}$

B. $\begin{cases} 2x + 3y = 41 \\ 5x + 6y = 92 \end{cases}$

C. $\begin{cases} 2x + 3y = 41 \\ 6x + 5y = 92 \end{cases}$

D. $\begin{cases} 3x + 2y = 41 \\ 5x + 6y = 92 \end{cases}$

7. Which of the following is an identity?

A. $3(x + 4) = 3x + 4$

B. $\dfrac{3x - 1}{2} = 4$

C. $x - 3 = -(3 - x)$

D. $x^2 + 3 = (x + 3)(x - 3)$

8. Mrs Lee spends less than \$100 to buy 5 towels and 3 toothbrushes. It is given that the price of a towel is 2 times that of a toothbrush and the price of a toothbrush is $\$x$, which of the following inequalities can be used to find the range of values of x?

A. $5x + 3(2x) \leq 100$

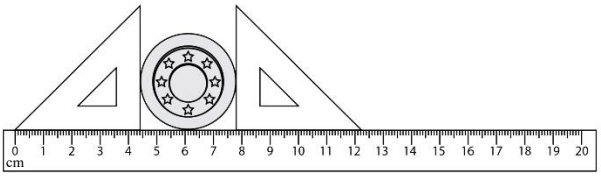
B. $5x + 3(2x) < 100$

C. $5(2x) + 3x \leq 100$

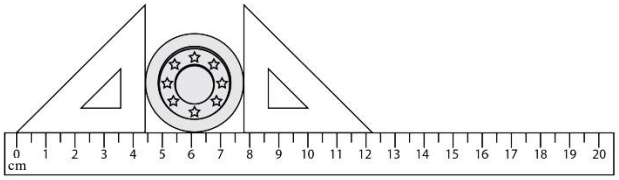
D. $5(2x) + 3x < 100$

9. Jenny measures the diameter of a button. Which of the following rulers can give a more accurate measurement?

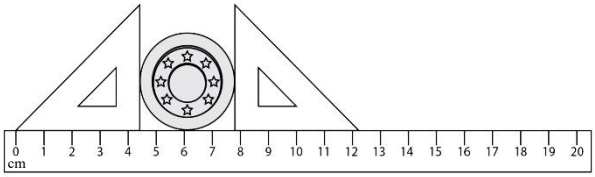
A.



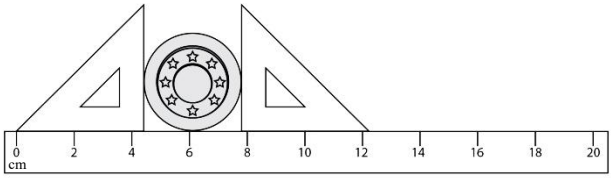
B.



C.



D.



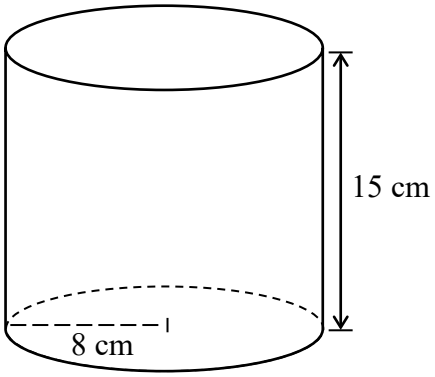
10. The figure shows a solid right cylinder. Its height is 15 cm and its base radius is 8 cm. Find the curved surface area of the cylinder.

A. 120π cm^2

B. 240π cm^2

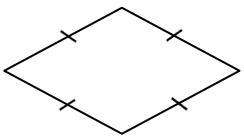
C. 368π cm^2

D. 960π cm^2



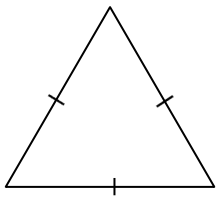
11. Which of the following figures can represent a regular polygon?

A.

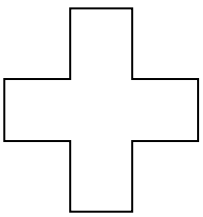


B.

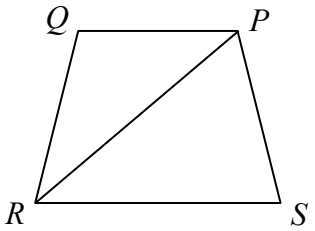
C.



D.



12. Which of the following represents a line segment in the figure?



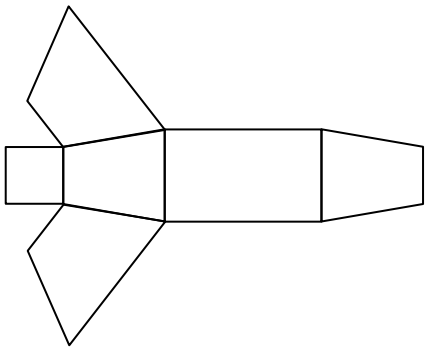
A. $\triangle PQR$

B. $\angle PQR$

C. PS

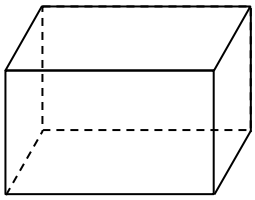
D. P

13.

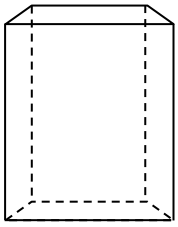


Which of the following 3-D figures can be made by the net above?

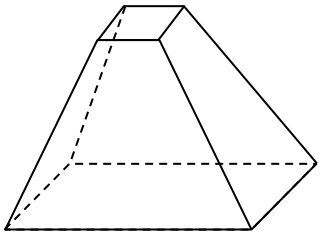
A.



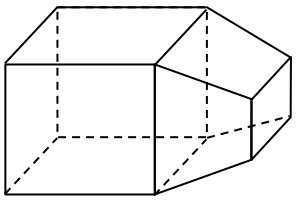
B.



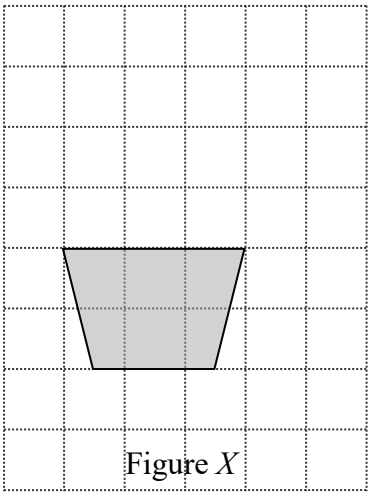
C.

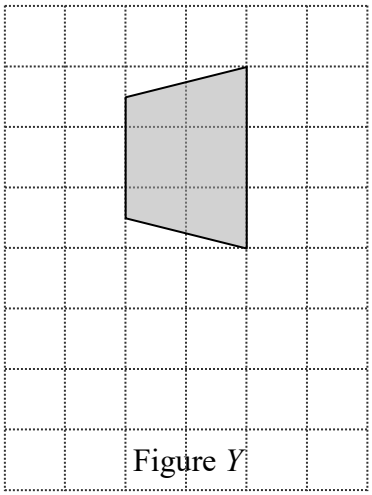


D.



14. Figure X is changed to Figure Y after a single transformation. What is the corresponding transformation?

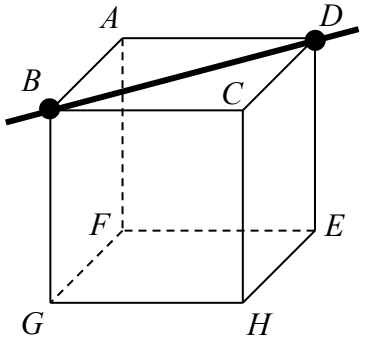




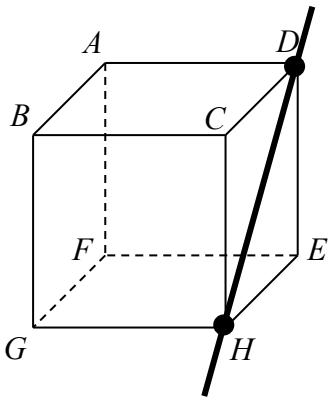
A. Enlargement
B. Translation
C. Reflection
D. Rotation

15. In the following figures, which thick line is an axis of rotational symmetry of cube $ABCDEFGH$?

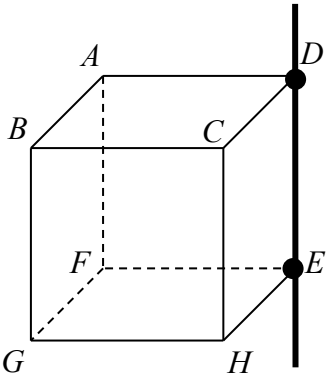
A.



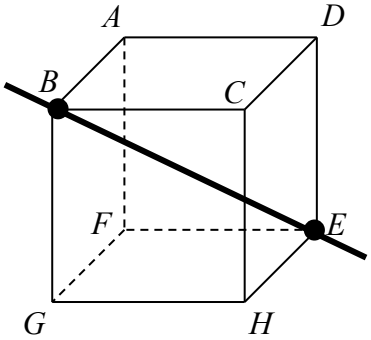
B.



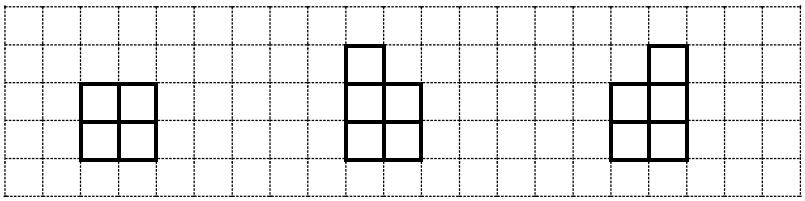
C.



D.

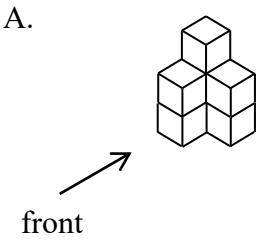


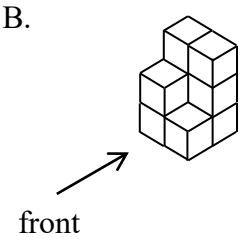
16. The figures below show the 2-D representations of a solid from various views.

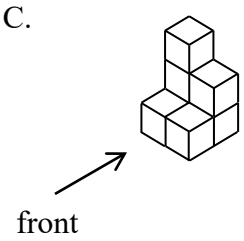


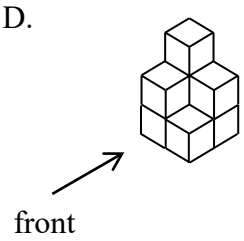
top view front view side view

Which of the following could be the solid?

A. 

B. 

C. 

D. 

17. $P(6, 15)$ and $Q(21, 24)$ are two points on a straight line L in the rectangular coordinate plane. Find the slope of L.

A. $\frac{5}{3}$

B. $\frac{3}{5}$

C. $\frac{9}{13}$

D. $\frac{13}{9}$

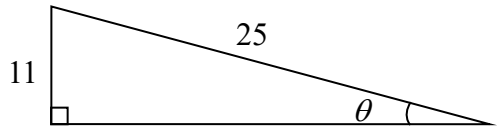
18. Referring to the figure, find θ. (Correct to 3 significant figures)

A. 23.7°

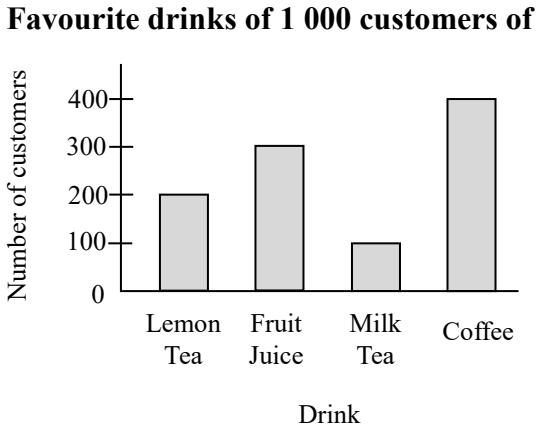
B. 26.1°

C. 63.9°

D. 66.3°

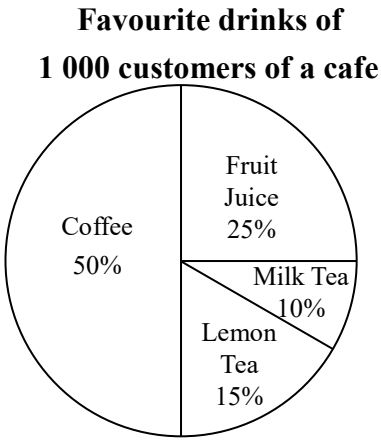


19. The bar chart below shows the favourite drinks of 1 000 customers of a cafe:

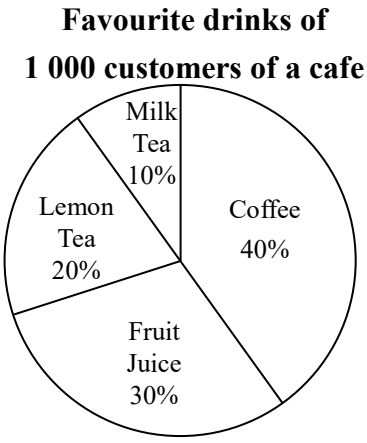


If the same set of data is presented by a pie chart, which of the following diagrams could be obtained?

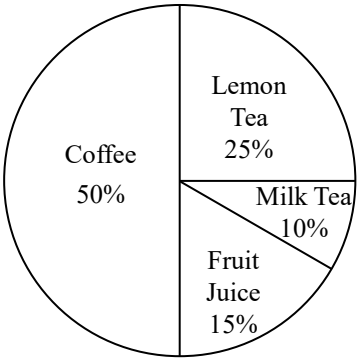
A.



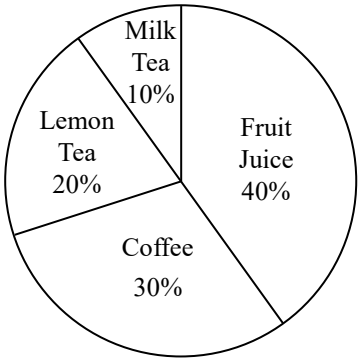
B.



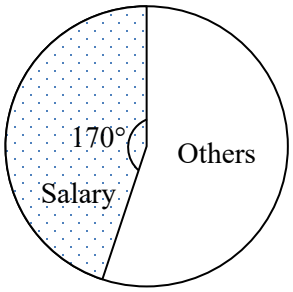
C.



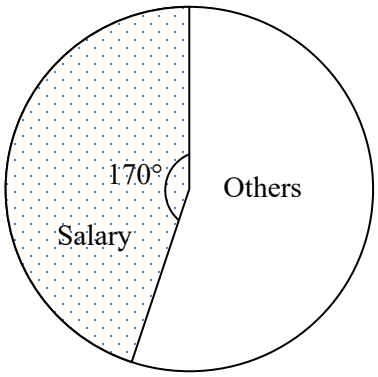
D.



20. The total expenditures of company A and company B are the same. The pie charts below show the expenditure distribution of company A and company B.



Expenditure of company A



Expenditure of company B

Based on the diagrams above, Mr Chan believes that the expenditure on salary of company B is more than that of company A.

Which of the following statements is the best reason that Mr Chan is **misled** by the above diagrams?

A. The business nature of these two companies is not shown.

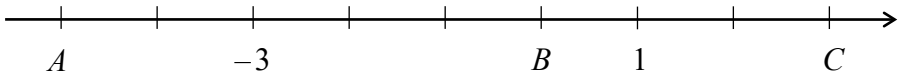
B. The number of staff of these two companies is not shown.

C. The total income of these two companies is not shown.

D. The size of the charts is not the same.

SECTION B: Write ALL the answers in the ANSWER BOOKLET. Working need not be shown.

21. Write down the numbers represented by A , B and C on the number line below.



22. The diameter of a red blood cell is about 0.000 007 m. Use scientific notation to represent this diameter.

23. In June, Kate's travel expenditure and expenditure on food are in the ratio $4 : 13$. If her travel expenditure in June is \$600 , find her expenditure on food in that month.

24. A scientific formula is given as follows:

$$E = \frac{mv^2}{2}$$

If $E = 10$ and $v = 2$, find the value of m.

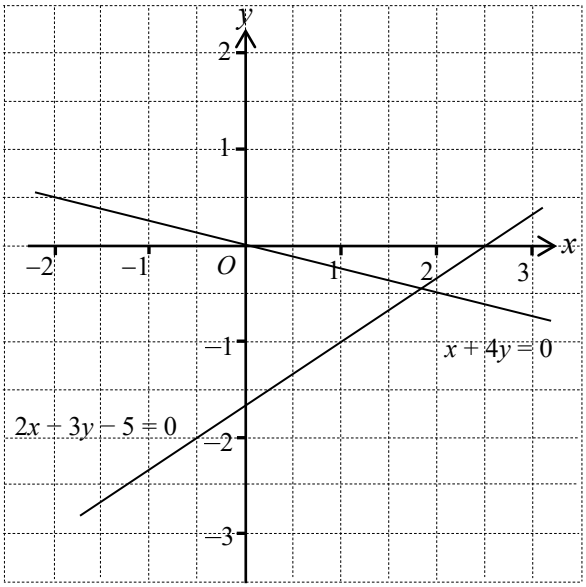
25. The n^{th} term of a sequence is $n^2 - 1$. Find the value of the 4^{th} term of the sequence.

26. Simplify $10y + 4 - 7y - 4$.

27. Factorize $y^2 - 36$.

28. Solve the equation $\frac{2x-3}{7} = 1$.

29.



The above figure shows the graphs of $2x - 3y - 5 = 0$ and $x + 4y = 0$.

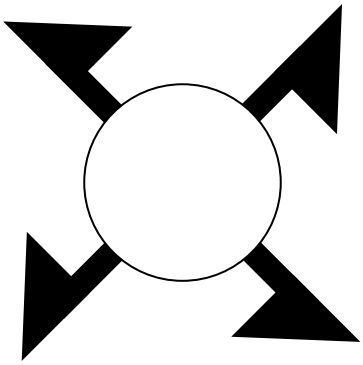
According to the given graphs, (2.0 , – 0.5) is the * exact solution / approximate solution of the simultaneous equations $\begin{cases} 2x - 3y - 5 = 0 \\ x + 4y = 0 \end{cases}$.

(*Circle the correct answer in the **ANSWER BOOKLET**)

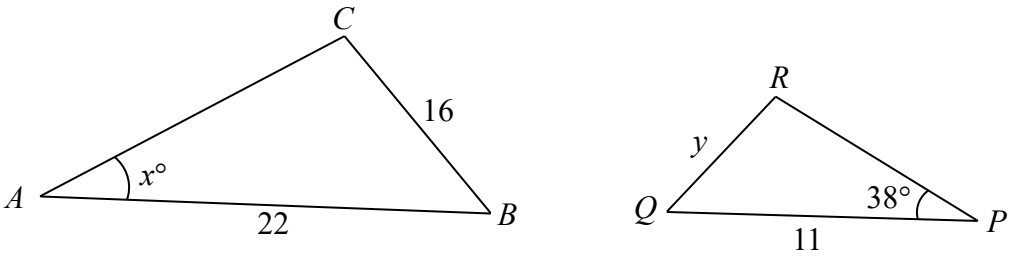
30. Solve the inequality $4 < 3x + 1$.

31. The circumference of a circle is 24π cm . Find its radius.

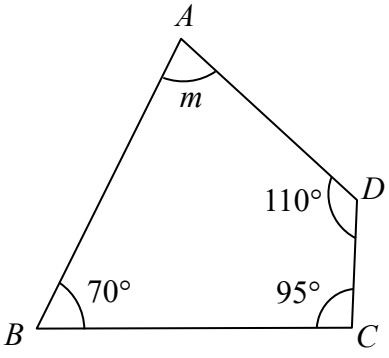
32. The figure below has rotational symmetry. Find its order of rotational symmetry.



33. In the figure, $\triangle ABC \sim \triangle PQR$. Find
    (a) the value of x ,
    (b) the value of y .

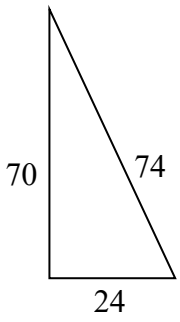


34. The figure shows the interior angles of a quadrilateral $ABCD$. Find m.

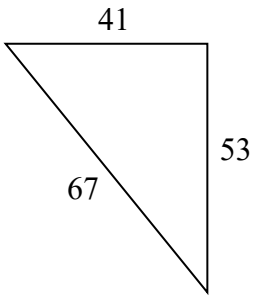


35. Which of the following must be right-angled triangle(s)? (May be more than one answer)

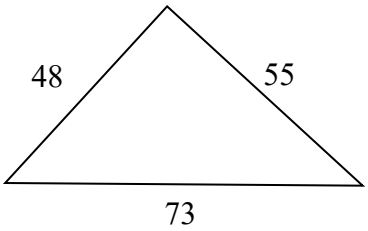
Triangle P



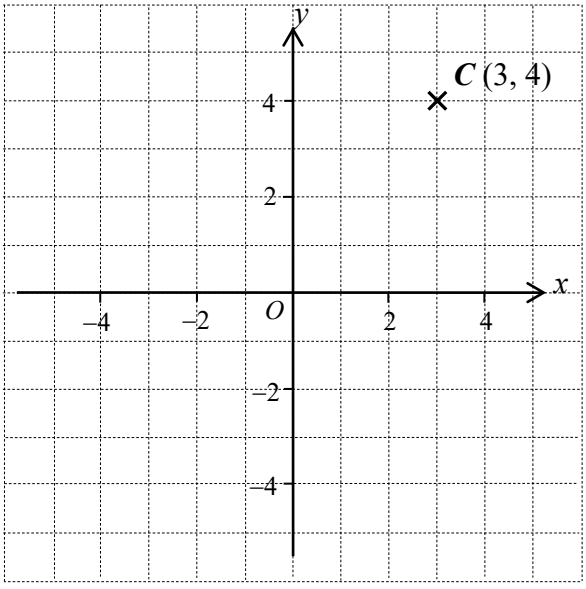
Triangle Q



Triangle R



36. In the figure, $\boldsymbol{C}\,(3, 4)$ is translated 2 units to the left to $\boldsymbol{C'}$. Find the coordinates of $\boldsymbol{C'}$.

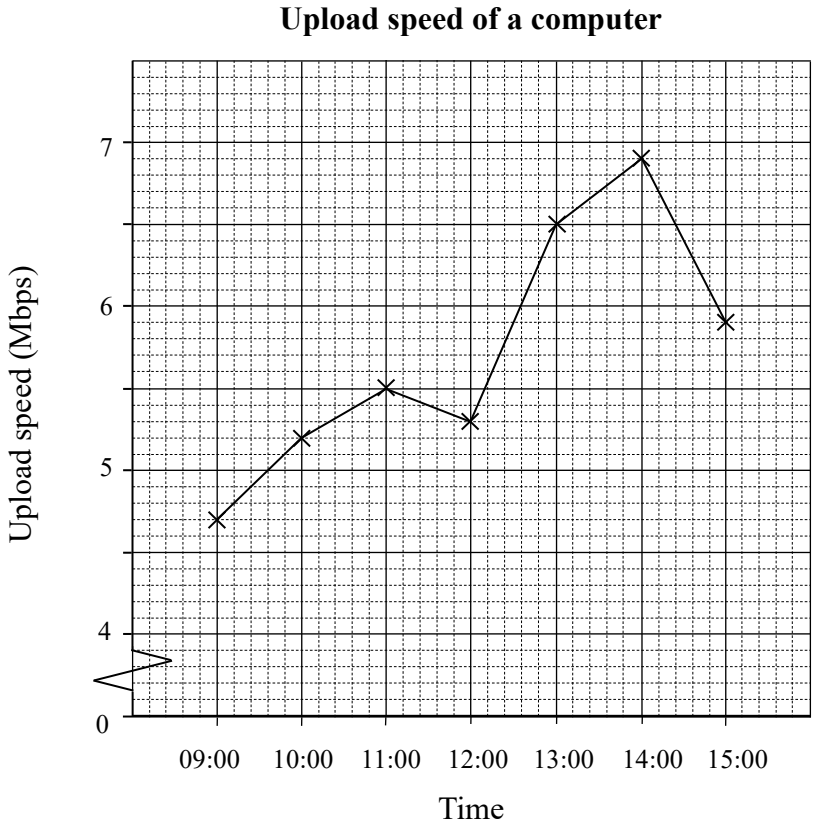


37. Determine whether each of the following data is discrete or continuous.

(i) The number of candies made by a candy factory every day

(ii) The weights of candies made by a candy factory every day

38. The following chart shows the upload speed (Mbps) of a computer.



According to the above chart, answer the following questions.

(a) At what time was the upload speed equal to 5.2 Mbps?

(b) At what time did the upload speed decrease most compared to the upload speed of one hour before?

(c) What was the difference of the upload speeds recorded at 12:00 and 13:00 ?

39. The following data show the number of attendance at a children's playground last week.

342, 579, 57, 64, 50, 72, 96

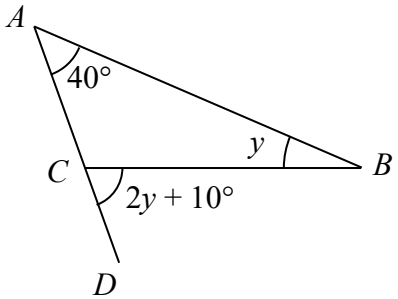
Find the mean and the median of the above data.

SECTION C: All working must be clearly shown.
Write the mathematical expressions, answers and statements/conclusions in the spaces provided in the ANSWER BOOKLET.

40. Morris deposits \$4 000 in a bank. After 2 years, he will receive a **simple interest** of \$240. Find the annual interest rate.

41. Two years ago, the yearly consumption of plastic bags by a clothes shop was 8 500 . Its yearly consumption is decreased by 20% each year. Find the yearly consumption of plastic bags by the clothes shop this year.

42. In the figure, ACD is a straight line. $\angle BAC = 40°$, $\angle ABC = y$ and $\angle BCD = 2y + 10°$. Find y .



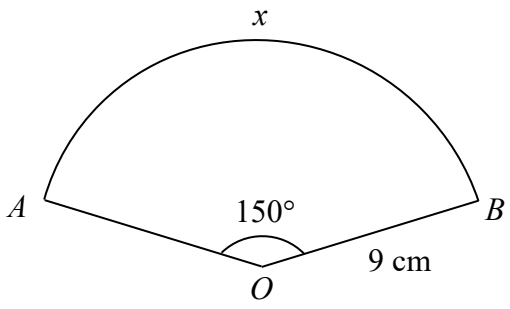
43. Solve the simultaneous equations $\begin{cases} 2x + y = 11 \\ x = 2y + 3 \end{cases}$.

44. Complete the table for the equation $y = \dfrac{x-1}{2}$ in the **ANSWER BOOKLET**.

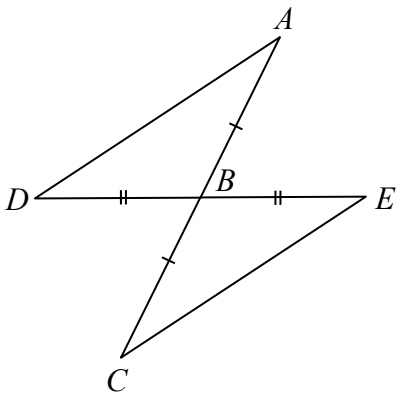
x	–3	1	3
y	–2		

According to the table, draw the graph of this equation on the rectangular coordinate plane given in the **ANSWER BOOKLET**.

45. In the figure, the radius of sector OAB is 9 cm and $\angle AOB = 150°$. Let x be the arc length of the sector, find x. Give the answer correct to 3 significant figures.



46. In the figure, ABC and DBE are straight lines. $AB = CB$ and $BD = BE$.
Prove that $\triangle ABD \cong \triangle CBE$.



47. The following table shows the mathematics results of 50 students of a private tuition institute in a public examination.

Grade	Distinction	Credit	Pass	Fail
Number of students	16	8	11	15

It is given that the mode of the results of these 50 students is "Distinction". Hence a claim "more than half of the students got distinction in that Mathematics public examination" is made by the tuition institute.
Do you agree on the claim made by the tuition institute? Explain your answer.

END OF PAPER

Do not write on this page.

Answers written on this page will not be marked.

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