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Education Bureau

Territory-wide System Assessment 2010

Secondary 3

Mathematics

QUESTION BOOKLET

INSTRUCTIONS

1. There are 52 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. Kenny is a security guard and works 7 hours every day. For 31% of the time he inspects the car park and the rest of time he stays in the office. Which of the following expressions is most appropriate to estimate the number of hours that Kenny stays in the office every day?

   A. $6 \times 30\%$ hours
   B. $6 \times 70\%$ hours
   C. $9 \times 30\%$ hours
   D. $9 \times 70\%$ hours

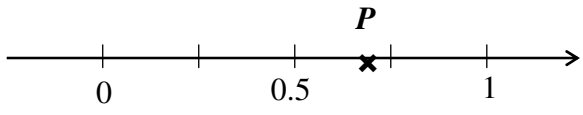
2. Round off 0.059 99 to 3 significant figures.

   A. 0.059 9
   B. 0.06
   C. 0.060
   D. 0.060 0

3. $3.2 \times 10^7 =$

   A. 320 000.
   B. 3 200 000.
   C. 32 000 000.
   D. 320 000 000.

4. Which of the following numbers is closest to the value represented by point ***P*** on the number line?



   A. 0.5
   B. $\frac{\sqrt{2}}{2}$
   C. $\frac{\sqrt{3}}{2}$
   D. 1

5. Which of the following is a polynomial?

A. $\frac{x^2}{2y} - 3$

B. $\frac{x^2 - 2y}{3}$

C. $x^2 - 2\sqrt{y}$

D. $2^x - 2y$

6. Expand $(4x - 2)(-x)$.

A. $-4x^2 + 2x$

B. $-2x^2$

C. $3x - 2$

D. $6x$

7. Sherman bought a bottle of Vitamin C pills. There were 50 pills in the bottle. He needed to take x pills every day. After a week, there were 29 pills left. Which of the following equations can be used to find the value of x?

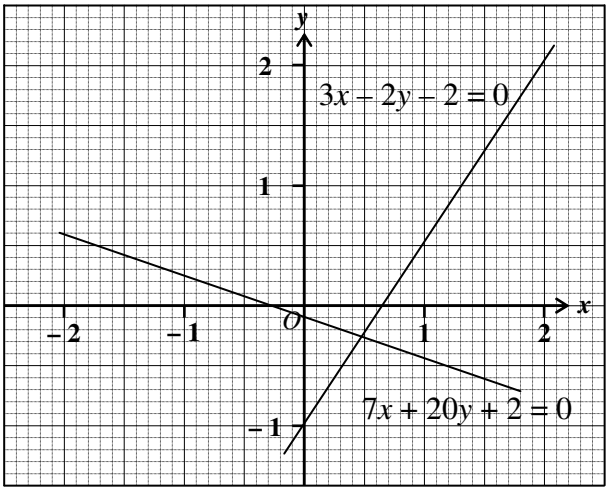
A. $x + 29 = 50$

B. $x - 50 = 29$

C. $7x + 29 = 50$

D. $7x - 50 = 29$

8.



The figure shows the graphs of $7x + 20y + 2 = 0$ and $3x - 2y - 2 = 0$.

Solve $\begin{cases} 7x + 20y + 2 = 0 \\ 3x - 2y - 2 = 0 \end{cases}$ graphically.

A. The exact solution is $(0.5 , -0.5)$.

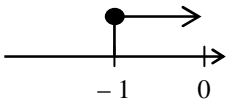
B. The exact solution is $(0.5 , -0.3)$.

C. The approximate solution is $(0.5 , -0.5)$.

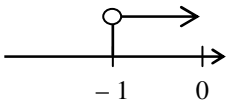
D. The approximate solution is $(0.5 , -0.3)$.

9. Which of the following diagrams represents $x \geq -1$?

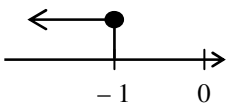
A.



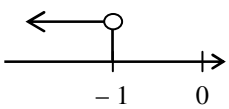
B.



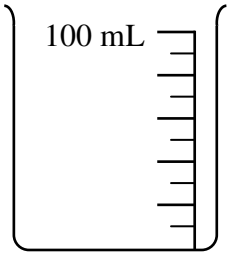
C.



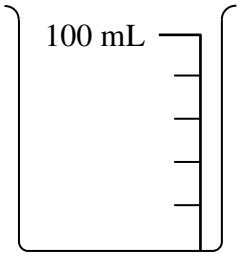
D.



10.



Beaker *A*



Beaker *B*

The figure shows Beaker *A* and Beaker *B* with different graduations. Fanny wants to find the volume of one drop of water. Among the following methods, which one is the best?

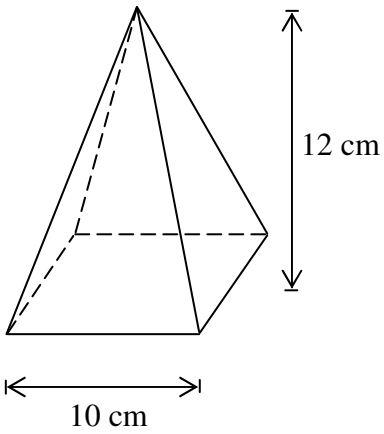
A. Fanny measures the volume of 20 drops of water using Beaker *A* and then divides the volume by 20.
B. Fanny measures the volume of 20 drops of water using Beaker *B* and then divides the volume by 20.
C. Fanny measures the volume of 200 drops of water using Beaker *A* and then divides the volume by 200.
D. Fanny measures the volume of 200 drops of water using Beaker *B* and then divides the volume by 200.

11. Which of the following descriptions of polygons **MUST** be correct?

A. Any rhombus must be a regular polygon.
B. Any isosceles triangle must be a regular polygon.
C. All interior angles of any regular polygon must be acute.
D. All sides of any regular polygon must be equal in length.

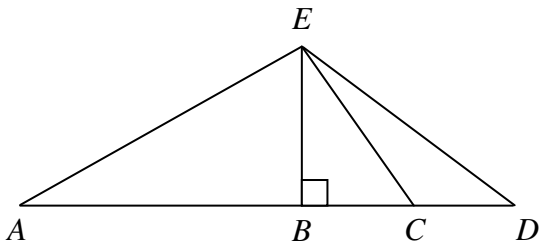
12. In the figure, the pyramid has a square base with a side length of 10 cm. Its height is 12 cm. The volume of the pyramid is

A. 400 cm^3.
B. 480 cm^3.
C. 1200 cm^3.
D. 3600 cm^3.

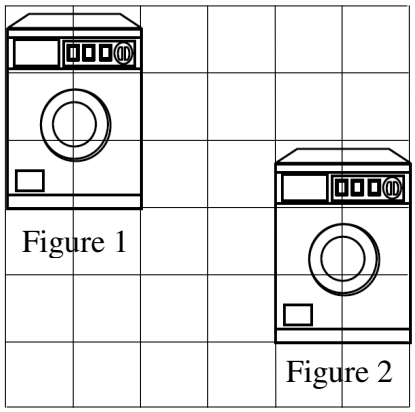


13. $ABCD$ is a straight line as shown in the figure. Which of the following is an obtuse angle?

A. $\angle EAB$
B. $\angle ECD$
C. $\angle EBC$
D. $\angle ABC$



14. Figure 1 is changed to Figure 2 after a single transformation.

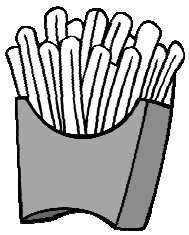


The transformation is

A. rotation.
B. reflection.
C. enlargement.
D. translation.

15. Will the size and shape of the figure on the right be changed after enlargement?

	Size	Shape
A.	unchanged	changed
B.	changed	changed
C.	changed	unchanged
D.	unchanged	unchanged



16. The table below shows the marks of 15 students in English and Music tests.

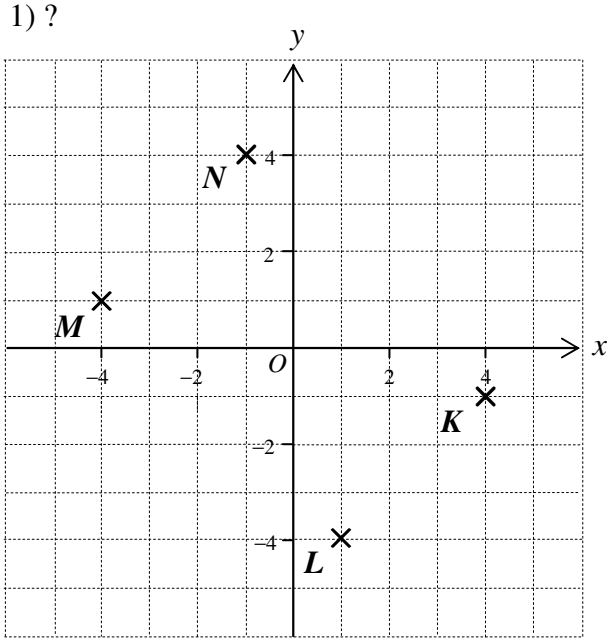
Students	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**	**O**
English test	12	67	33	74	86	24	47	90	73	23	64	42	83	49	65
Music test	16	55	38	81	79	20	42	86	68	24	68	51	86	46	71

Mr Ho wants to use a statistical graph to find out whether the marks of the 2 tests relate to each other. Which of the following graphs is the most suitable?

A. Scatter diagram
B. Cumulative frequency polygon
C. Pie chart
D. Histogram

17. In the figure, which point has coordinates $(-4, 1)$?

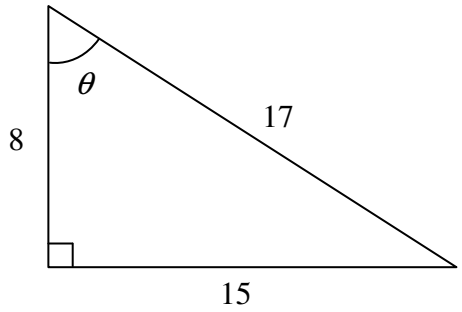
A. ***K***
B. ***L***
C. ***M***
D. ***N***



18. $A(-6, 8)$ and $B(4, -2)$ are two points in the rectangular coordinate plane. The midpoint of AB is

A. $(-1, 3)$.
B. $(-2, 6)$.
C. $(-5, 5)$.
D. $(-10, 10)$.

19. Find the value of $\cos\theta$ in the figure.



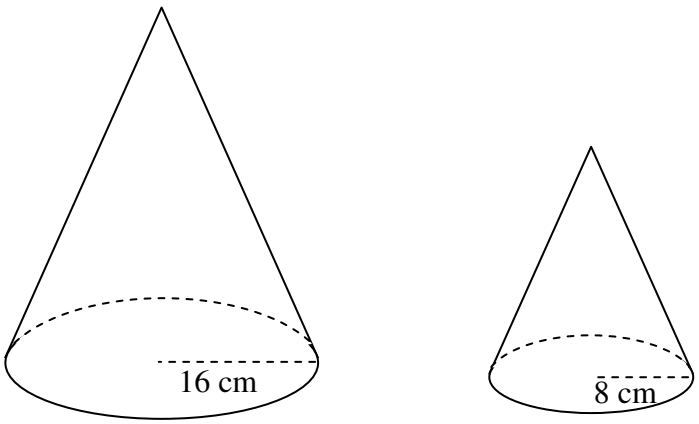
A. $\frac{15}{17}$

B. $\frac{17}{8}$

C. $\frac{17}{15}$

D. $\frac{8}{17}$

20. In the figure, the base radii of two similar cones are 16 cm and 8 cm respectively. If the total surface area of the larger cone is A cm^2, find the total surface area of the smaller cone.



A. $\frac{A}{2}$ cm^2

B. $\frac{A}{4}$ cm^2

C. $\frac{A}{8}$ cm^2

D. $\frac{A}{64}$ cm^2

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

21. Hong Kong Observatory uses positive and negative numbers to represent temperature in degree Celsius (°C). Use suitable numbers to represent the following temperatures:

(i) 7 degrees below zero
(ii) 32 degrees

22. Calculate $(-2)[(-6)+(-3)(4)]$.

23. The price of a ferry ticket has increased from \$50 to \$60. Find the percentage increase of the price.

24. Martin and Joseph share a certain number of commemorative banknotes in the ratio of 4 : 9. Martin gets 28 banknotes. How many banknotes does Joseph get?

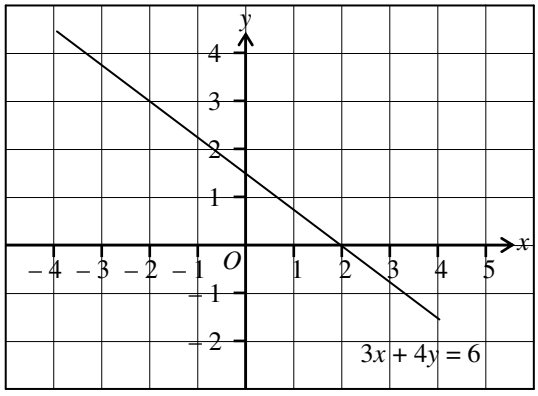
25. According to the pattern of the first four terms in the given sequence, write down the values of the 5th and 6th terms in the **ANSWER BOOKLET**.

80, –40, 20, –10, _____ , _____ , . . .

26. Find the degree of the polynomial $3x^4 - x^6 - 2x^5 - 10$.

27. Factorize $9ab^2 - 15a^2b$.

28.



The above figure shows the graph of $3x + 4y = 6$. Which of the following points lie on the graph? (May be more than one answer)

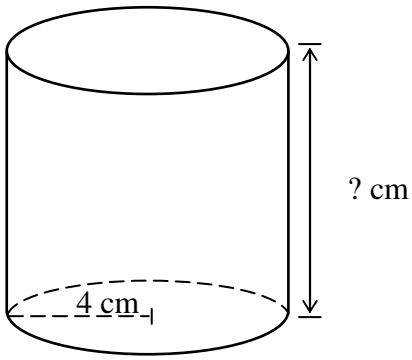
$P(3, -1)$, $Q(-2, 3)$, $R(-3, 4)$, $S(2, 0)$

29. Expand $(x+2y)(x-2y)$.

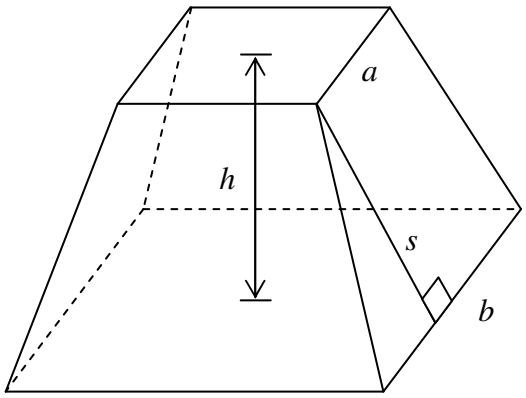
30. Make x the subject of the formula $y=\dfrac{x}{1+x}$.

31. Solve the inequality $3x+1\geq 10$.

32. The figure below shows a right cylinder. Its base radius is 4 cm and its curved surface area is $24\ \pi\text{cm}^2$. Find the height of the cylinder.



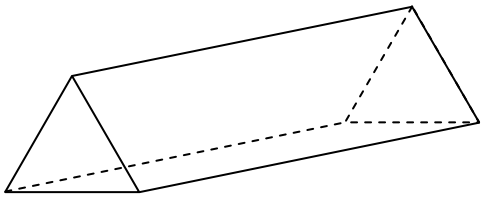
33. In the figure, the top and the base of the right frustum are squares of side lengths a and b respectively. The height of the frustum is h and the height of the lateral planes is s. By considering the dimensions, distinguish the following formulae according to the volume, the surface area, or the total sum of lengths of the frustum.



(i) $\dfrac{h(a^2+ab+b^2)}{3}$

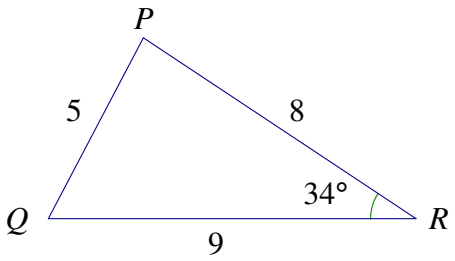
(ii) $(a+b)(2s+a+b)-2ab$

34. The figure shows the diagram of a triangular prism:



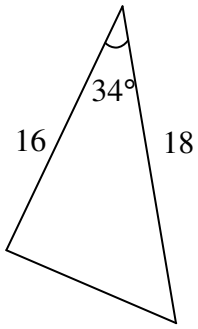
In the space provided in the **ANSWER BOOKLET,** draw a diagram of a cuboid. (Use solid lines and dotted lines to show all edges)

35.

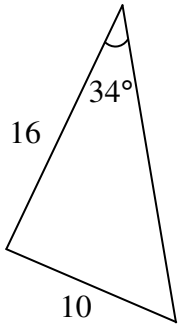


Which of the following triangles **MUST** be similar to the $\triangle PQR$ as shown in the above figure? (May be more than one answer)

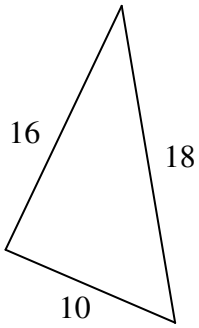
Triangle *A*



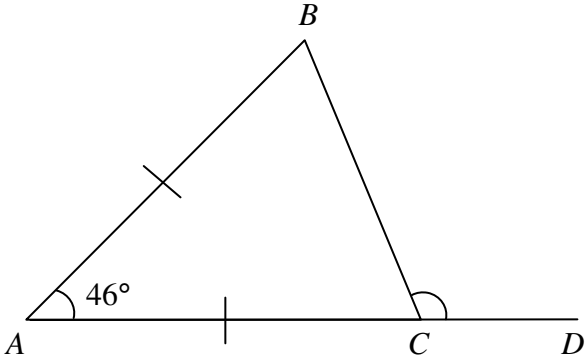
Triangle *B*



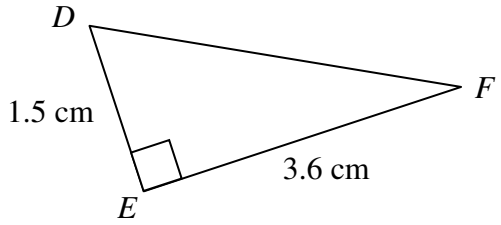
Triangle *C*



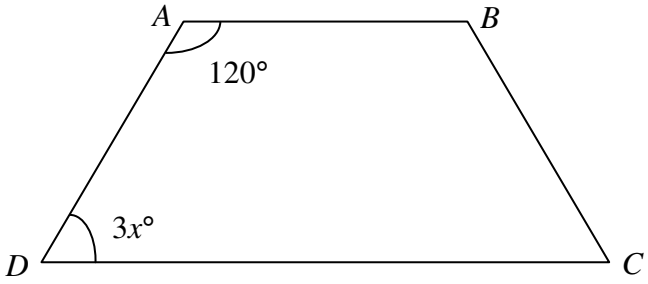
36. In the figure, ACD is a straight line and $AB = AC$. Find $\angle BCD$.



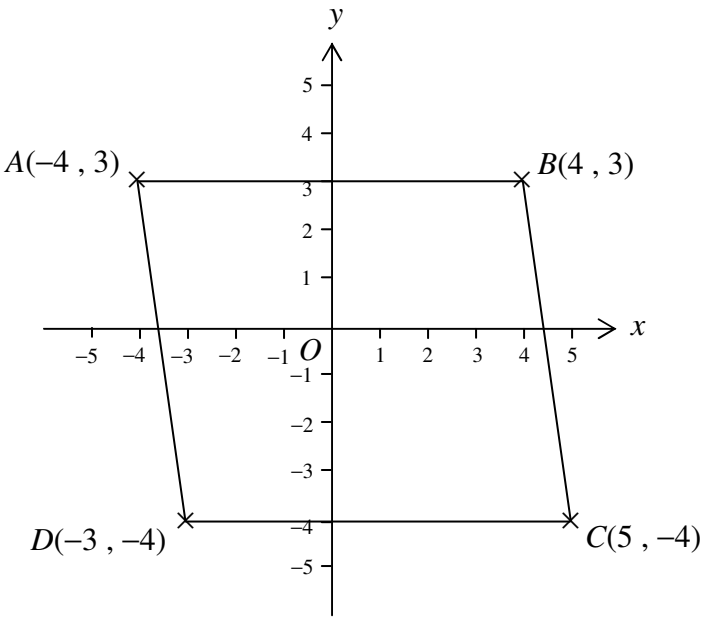
37. In the figure, $\angle DEF = 90°$, $DE = 1.5\,\text{cm}$, $EF = 3.6\,\text{cm}$. Find the length of DF.



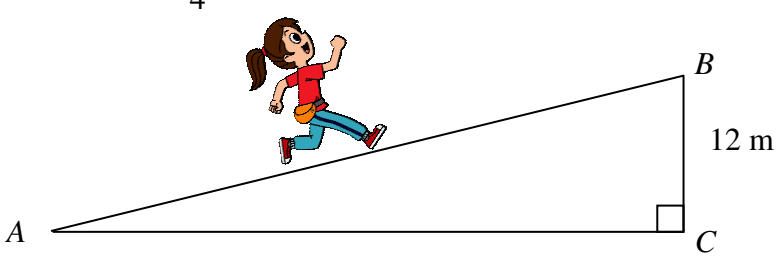
38. In the figure, $ABCD$ is a trapezium. Find the value of x.



39. Find the area of parallelogram $ABCD$ in the rectangular coordinate plane.



40. Vivian walks along a path AB of slope $\frac{1}{4}$. If the vertical distance BC is 12 m, find the horizontal distance AC.

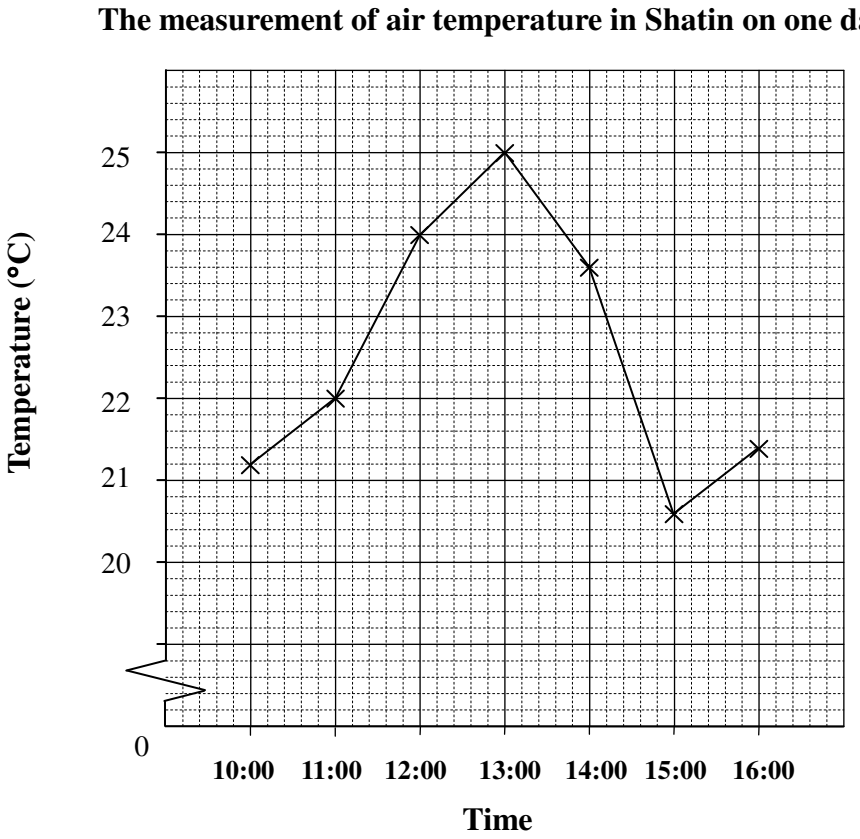


41. Determine whether each of the following data is discrete or continuous.

(i) The number of reservoirs in Hong Kong

(ii) The height of water level of Pok Fu Lam Reservoir

42. The following chart shows the measurement of air temperature (°C) in Shatin on one day.



According to the above chart, answer the following questions.

(a) At what time was the air temperature of Shatin the lowest ?

(b) What was the difference between the lowest and the highest temperature?

(c) At what time did Shatin have the biggest increase in temperature compared to the temperature one hour before?

43. Find the mode of the following data:

12, 3, 9, 6, 6, 3, 3, 81, 3

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

44. May deposited \$3 000 in a bank at a simple interest rate. After 3 years, she received the amount of \$3 270. Find

(a) the interest received after three years;
(b) the annual interest rate.

45. The present value of a machine is \$20 000. The rate of depreciation is 20% in each year. Find the value of the machine after three years.

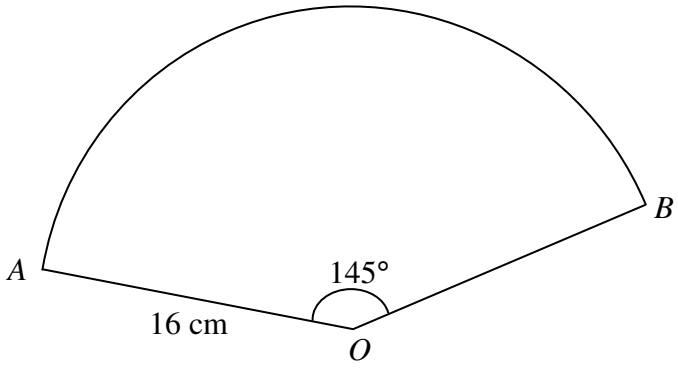
46. Rainbow factory is required to pay a sewage charge of \$5 240 this year. If the sewage charge is \$1.31 / m^3 of water consumed, find the volume of water (m^3) Rainbow factory consumed this year.

47. Complete the table for the equation $y = \frac{2-x}{2}$ in the **ANSWER BOOKLET**.

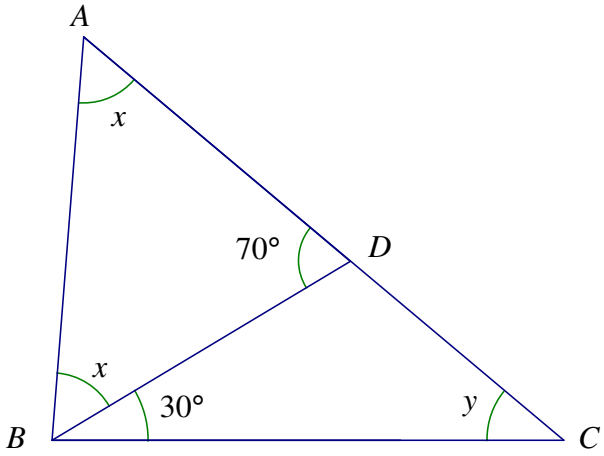
x	-2	0	2
y		1	

Draw the graph of this equation on the rectangular coordinate plane given in the **ANSWER BOOKLET**.

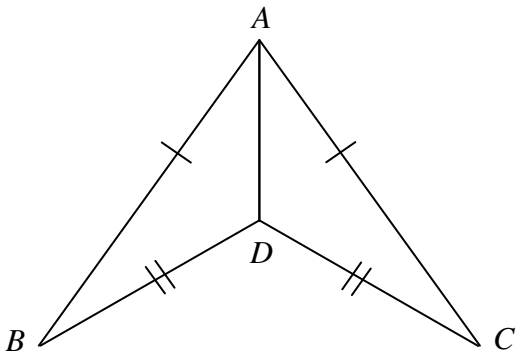
48. In the figure, the radius of sector OAB is 16 cm and $\angle AOB = 145°$. Find the area of the sector and correct the answer to the nearest 0.1 cm^2.



49. In the figure, ADC is a straight line, $\angle ADB = 70°$ and $\angle CBD = 30°$. Find the values of x and y.



50. In the figure, $AB = AC$ and $BD = CD$. Prove that $\triangle ABD \cong \triangle ACD$.



51. The following data show the numbers of books borrowed by 20 students from the library in the first term.

9	36	24	18	22
34	21	28	6	32
46	4	13	14	47
15	27	7	10	5

Use the data to complete the two frequency distribution tables in the **ANSWER BOOKLET**.

52. Terence is responsible for buying gifts for a Christmas party. He has $70 and spends as much as possible. There are 3 kinds of gifts available, and their prices are $9.8, $18.9 and $29.4 respectively. Terence must buy at least 2 kinds of gifts with different prices. Using estimation, find the number of gifts that can be bought by Terence, and briefly explain your method.

END OF PAPER

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