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Education Bureau
Territory-wide System Assessment 2014
Secondary 3 Mathematics
QUESTION BOOKLET

INSTRUCTIONS

1. There are 50 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	$= \pi rl$
	Volume	$= \frac{1}{3}\pi r^2 h$
Prism	Volume	$= \text{base area} \times \text{height}$
Pyramid	Volume	$= \frac{1}{3} \times \text{base area} \times \text{height}$

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

1. In each of the following situations, determine whether the value mentioned is obtained by estimation or by computation of the exact value.

- (i) A fire broke out in a building, 16 firemen were sent to put out the fire.
 (ii) A wildfire broke out in the countryside, 16 square kilometres of land was burned.

	(i)	(ii)
A.	Computation of the exact value	Computation of the exact value
B.	Computation of the exact value	Estimation
C.	Estimation	Computation of the exact value
D.	Estimation	Estimation

2. $5.28 \times 10^{-5} =$

- A. 528 000.
 B. 52 800 000.
 C. 0.000 052 8.
 D. 0.000 005 28.

3. Vivian is x years old now. Connie is 3 times as old as Vivian. After 4 years, Connie is

- A. $(3x + 4)$ years old.
 B. $(3x - 4)$ years old.
 C. $3(x + 4)$ years old.
 D. $3(x - 4)$ years old.

4. $(8x^3)(8x^3) =$

A. $16x^6$.

B. $16x^9$.

C. $64x^6$.

D. $64x^9$.

5. Mabel participated in a running programme. She ran x km on the first day. The second day she ran 3 km more than she did on the first day. The third day she ran 3 km more than she did on the second day. If Mabel ran a total of 39 km during these 3 days, which of the following equations can be used to find the value of x ?

A. $x + 3 + 3 = 39$

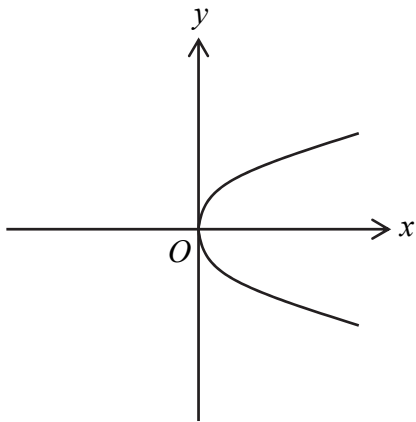
B. $x + 3 + 6 = 39$

C. $x + (x + 3) + (x + 3) = 39$

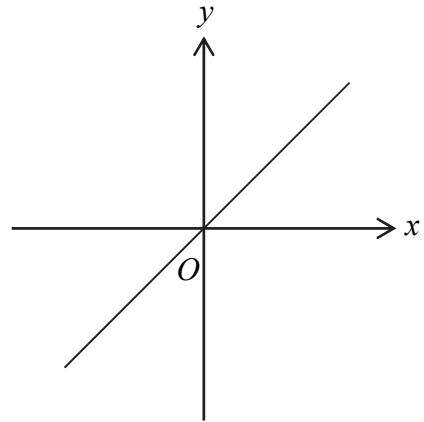
D. $x + (x + 3) + (x + 6) = 39$

6. Which of the following may represent the graph of the equation $x - y = 0$?

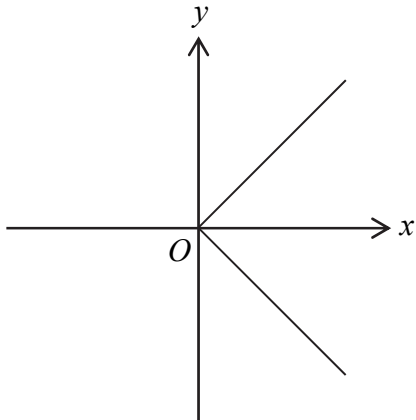
A.



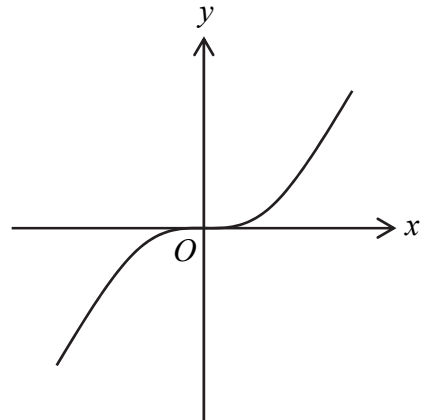
B.



C.



D.



7. There are 960 students in a school. The number of boys is less than that of girls by 24. If there are x boys and y girls in the school, which of the following pairs of simultaneous equations shows the relation between x and y ?

A.
$$\begin{cases} x + y = 960 \\ x - y = 24 \end{cases}$$

B.
$$\begin{cases} x + y = 960 \\ y - x = 24 \end{cases}$$

C.
$$\begin{cases} x = 960 + y \\ x - y = 24 \end{cases}$$

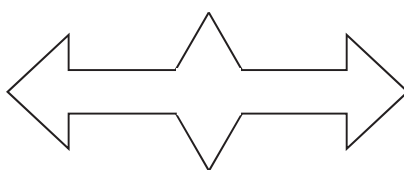
D.
$$\begin{cases} x = 960 + y \\ y - x = 24 \end{cases}$$

8. The price of an adult ticket of the Coral Park is \$ x . The price of a child ticket is half of the price of an adult ticket. If the total cost of buying 3 adult tickets and 1 child ticket is not more than \$800, which of the following inequalities can be used to find the range of values of x ?
- A. $3x + 2x \geq 800$
B. $3x + 2x \leq 800$
C. $3x + \frac{x}{2} \geq 800$
D. $3x + \frac{x}{2} \leq 800$
9. The weight of a car is 960 kg (correct to the nearest kg). Which of the following could be its actual weight?
- A. 959.0 kg
B. 959.4 kg
C. 959.6 kg
D. 960.8 kg
10. The diameter of a circle is 30 cm. Find its circumference. Express the answer in terms of π .
- A. 30π cm
B. 60π cm
C. 225π cm
D. 900π cm

11. The ratio of the corresponding heights of two similar solids is 2 : 3. Which of the following is the ratio of their volumes?

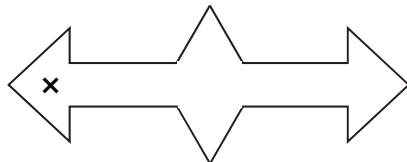
- A. 2 : 3
- B. $2^2 : 3^2$
- C. $2^3 : 3^3$
- D. $2^4 : 3^4$

12.

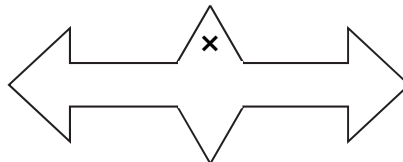


The figure above has rotational symmetry. Which 'x' in the following figures indicates its centre of rotation?

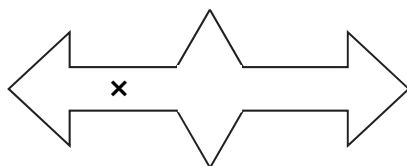
A.



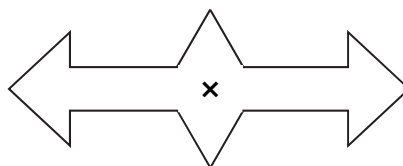
B.



C.



D.



13.

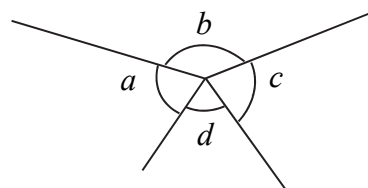


Will the size and shape of the above figure be changed after enlargement?

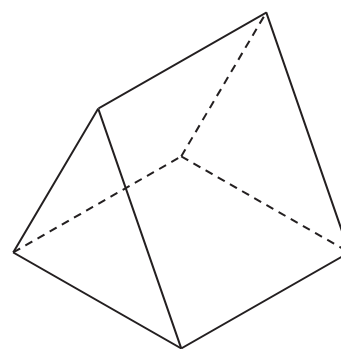
	Size	Shape
A.	unchanged	unchanged
B.	unchanged	changed
C.	changed	unchanged
D.	changed	changed

14. In the figure, a , b , c and d are

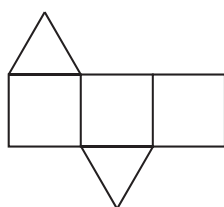
- A. vertically opposite angles.
- B. interior angles on the same side.
- C. corresponding angles.
- D. angles at a point.



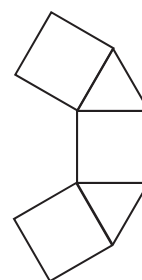
15. Which of the following nets can be folded into a right prism with equilateral triangles as bases?



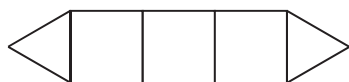
A.



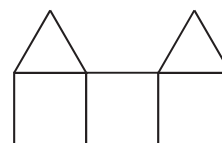
B.



C.

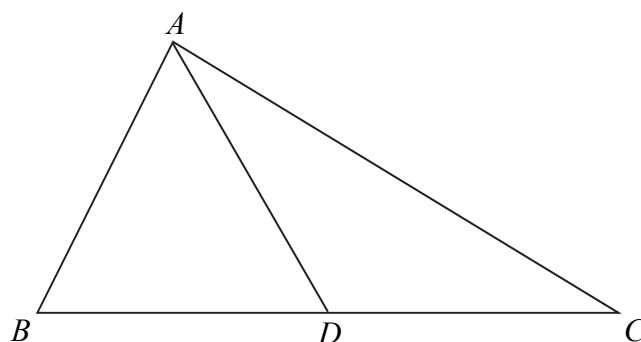


D.



16. In $\triangle ABC$, $BD = DC$. AD **MUST** be

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

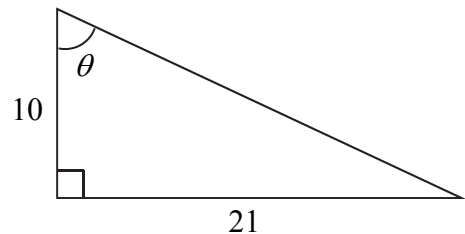


17. $A(4, 1)$ and $B(-2, 8)$ are two points on a straight line L in a rectangular coordinate plane. Find the slope of L .

- A. $\frac{6}{-7}$
- B. $\frac{-7}{6}$
- C. $\frac{2}{9}$
- D. $\frac{9}{2}$

18. Refer to the figure, find θ . (Correct to the nearest degree)

- A. 65°
- B. 62°
- C. 28°
- D. 25°



19. Which of the following data is continuous?

- A. The number of votes received by the candidates in the Legislative Council Election.
- B. The waiting time of patients in a hospital.
- C. The number of goals scored by football players.
- D. The number of students admitted by universities last year.

20. The following data show the weights (kg) of 5 students:

60, 50, 40, 50, 60

Based on the above data, which of the following is correct?

- A. The mean is 40 kg.
- B. The mean is 50 kg.
- C. The median is 40 kg.
- D. The median is 50 kg.

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

21. Joey uses directed numbers to represent the changes of the weights of her family members.
For example,
+2 kg represents an increase of 2 kg in body weight.

Use directed numbers (positive numbers, negative numbers or zero) to represent the following situations:

- (i) The weight of father is unchanged.
(ii) The weight of mother has decreased by 4 kg.

22. The distance between Hong Kong and Los Angeles is about 11 700 km. Use scientific notation to represent this number.
23. There are 357 male clerks in a company. The numbers of male and female clerks are in the ratio 7 : 9. Find the number of female clerks in the company.

24. The number of diagonals (S) of a convex polygon can be calculated by the following formula:

$$S = \frac{n(n-3)}{2}, \text{ where } n \text{ is the number of sides of the polygon.}$$

If $n = 13$, find the value of S .

25. Figure 1 to Figure 4 consist of 3, 6, 9 and 12 dots respectively.

Figure 1	
Figure 2	
Figure 3	
Figure 4	

According to the above pattern, how many dots does Figure n consist of ? (Express the answer in terms of n)

26. Expand $a(2a + 5b)$.

27. Expand $(x + 1)(2x + 1)$.

28. Factorize $2x^2 - 5x + 2$.

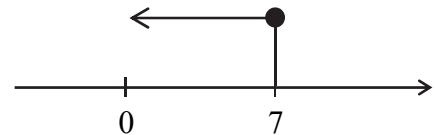
29. Simplify $\frac{5y}{4x} + \frac{5y}{2x}$.

30. In the **ANSWER BOOKLET**, fill in the boxes with $>$ or $<$ to express the relations between the numbers.

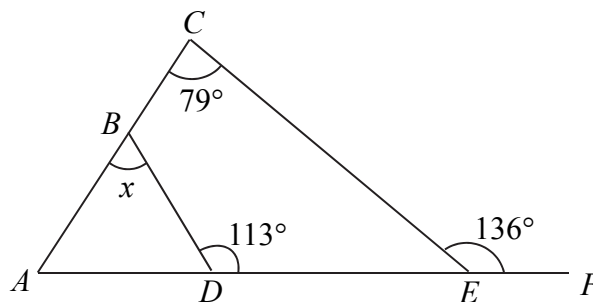
i. $\frac{5}{7}$ $\frac{5}{6}$

ii. -0.88 -8.8

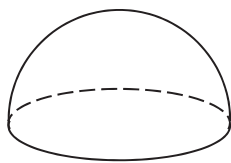
31. According to the diagram, write down an inequality in x .



32. In the figure, ABC and $ADEF$ are straight lines, $\angle BDE = 113^\circ$, $\angle ACE = 79^\circ$ and $\angle CEF = 136^\circ$. Find x .

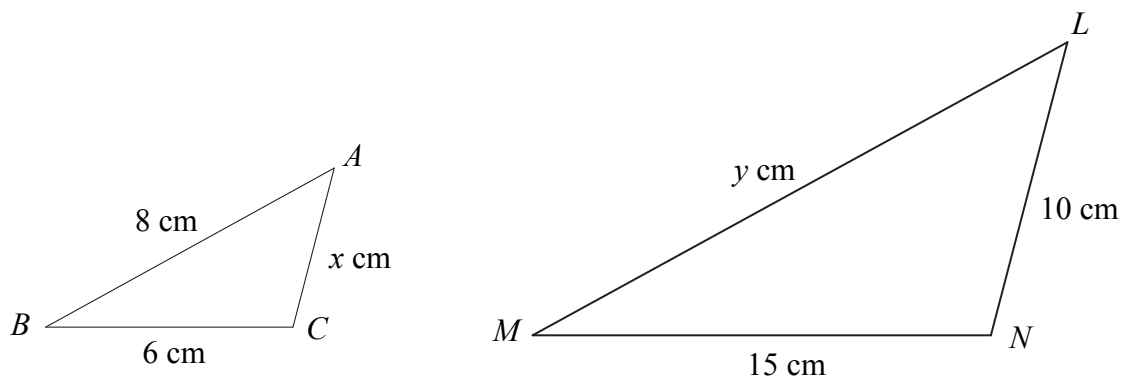


33. The figure shows the diagram of a hemisphere.



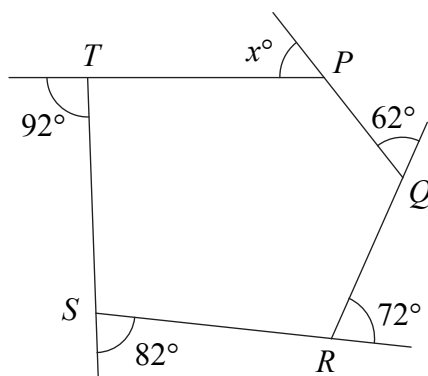
Referring to the sketching shown above, draw a diagram of a **cone** in the space provided in the ANSWER BOOKLET.

- 34.

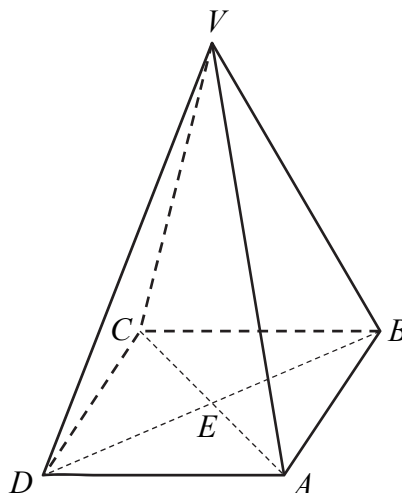


In the figure, $\triangle ABC \sim \triangle LMN$. Find

- the value of x ,
 - the value of y .
35. The figure shows the exterior angles of a pentagon $PQRST$. Find the value of x .

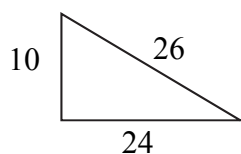


36. $VABCD$ is a right pyramid with a square base $ABCD$. $ABCD$ is a horizontal plane. E is the point of intersection of AC and BD . Name the projection of VD on the plane $ABCD$.

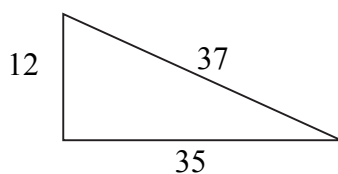


37. Which of the following must be right-angled triangle(s)? (May be more than one answer)

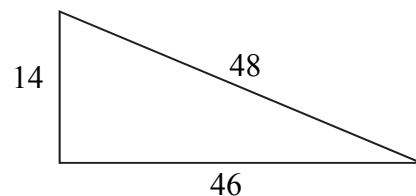
Triangle A



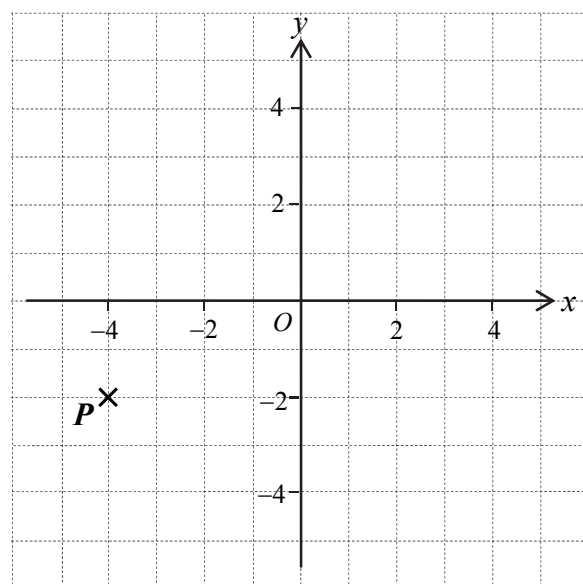
Triangle B



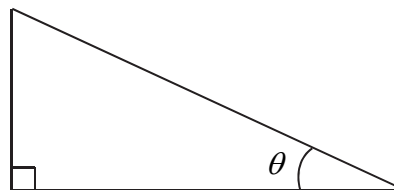
Triangle C



38. Find the coordinates of point P in the figure.



39. In the figure, $\sin \theta = 0.42$. Find θ . (Correct to the nearest 0.1°)



40. A librarian of Excellent Secondary School is doing a survey to analyse the reading habit of Secondary Three students in the school. The survey is conducted in the following four stages.

- (1) Analysing pie charts and data to draw conclusions.
- (2) Organising the data collected from the questionnaires.
- (3) Using pie charts to represent the data.
- (4) Giving questionnaires about the reading habit to the Secondary Three students.

Arrange these stages in the correct order. For example: (1) $\rightarrow$ (2) $\rightarrow$ (3) $\rightarrow$ (4)

41. The following table shows the time for 50 athletes to finish a 10 km running race.

Time (minute)	30 – 34	35 – 39	40 – 44	45 – 49	50 – 54
Frequency	6	18	12	10	4

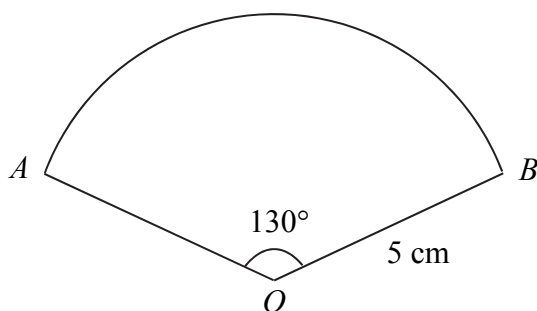
Find the modal class of the time for the 50 athletes to finish the race.

SECTION C: All working must be clearly shown.

Write the mathematical expressions, answers and statements/conclusions in the spaces provided in the ANSWER BOOKLET.

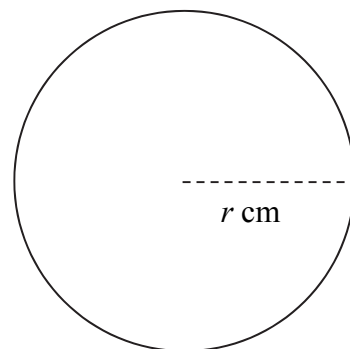
42. The cost price of a painting is \$4 500. It is sold at a profit of 40%. Find the selling price of the painting.

43. In the figure, the radius of sector OAB is 5 cm and $\angle AOB = 130^\circ$. Find the area of the sector. Correct the answer to the nearest 0.1 cm^2 .



44. In the figure, the radius of the circle is $r \text{ cm}$. Its area is $81\pi \text{ cm}^2$.

- (a) Find the value of r .
(b) Find the circumference of the circle.
Express the answer in terms of π .



45. (a) Simplify $\frac{w^{11}}{w^8}$ and express the answer with positive index.
(b) Simplify $\frac{x^{11}}{(x^2)^4}$ and express the answer with positive index.

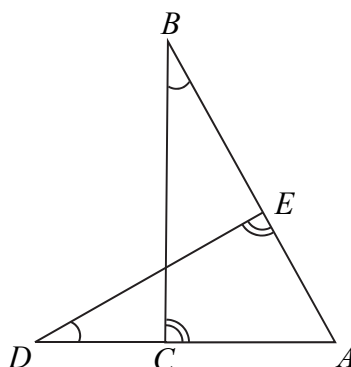
46. Complete the table for the equation $2x + y - 2 = 0$ in the **ANSWER BOOKLET**.

x	-1	0	3
y		2	

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

47. In a shopping mall, customers can join a lucky draw for any purchase of \$1 000 or above. Miss Lee bought 3 items in the shopping mall. The prices of the items are \$312, \$601 and \$121. Give **an appropriate approximation** for the price of each of the items. Hence, estimate the total amount that Miss Lee paid for the items. Briefly explain whether she can join the lucky draw.

48. In the figure, AEB and ACD are straight lines, $\angle ABC = \angle ADE$ and $\angle ACB = \angle AED$. Prove that $\triangle ABC \sim \triangle ADE$.



49. The table below shows the number of visitors of a country from 2007 to 2011.

Year	2007	2008	2009	2010	2011
Number of visitors (million)	13	17	24	22	28

Construct a broken line graph to present the above data in the **ANSWER BOOKLET**.

50. A letter is randomly chosen from each of the two words 'BOY' and 'TOY' respectively.
- (a) Some of the possible outcomes are given in the table provided in the **ANSWER BOOKLET**.
Fill in the remaining ones in the blanks.
 - (b) Find the probability that the two letters chosen are the same.

END OF PAPER

Do not write on this page.

Answers written on this page will not be marked.

