9	M	E	1	(	Q	)

Education Bureau

Territory-wide System Assessment 2016

Secondary 3 Mathematics

QUESTION BOOKLET

INSTRUCTIONS

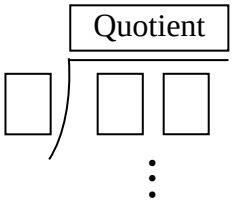
1. There are 47 questions in this paper.
2. The time allowed is 65 minutes.
3. Answer ALL questions in the separate ANSWER BOOKLET.
4. The use of HKEAA approved calculators is permitted.
5. Unless otherwise specified, numerical answers should be either exact or correct to 3 significant figures.
6. Rough 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. Which of the following numbers **CANNOT** be the quotient when a two-digit number is divided by a one-digit number?



A. 9
B. 10
C. 20
D. 100

2. 4.06×10^{-3} =

A. 0.000 406.
B. 0.004 06.
C. 4 060.
D. 406 000.

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

(i) The capacities of a cup and a vase are 200 mL and 800 mL respectively.
(ii) A lift rises 15 metres per 10 seconds.

	(i)	(ii)
A.	Rate	Ratio
B.	Ratio	Rate
C.	Ratio	Ratio
D.	Rate	Rate

4. The prices of an orange and a mango are \$3 and \$7 respectively. Betty pays at most \$35 to buy x oranges and y mangos. Which of the following inequalities represents the relationship between x and y?

A. $3x + 7y > 35$

B. $3x + 7y < 35$

C. $3x + 7y \geq 35$

D. $3x + 7y \leq 35$

5. Which of the following polynomials is in ascending powers of y?

A. $y^2 + 3y + 2$

B. $3y + y^2 + 2$

C. $y^2 + 2 + 3y$

D. $2 + 3y + y^2$

6. Eric is x years old now. After 28 years, his age will be 3 times his present age. Which of the following equations can be used to find the value of x?

A. $x + 28 = 3x$

B. $x - 28 = 3x$

C. $\frac{x}{3} + 28 = x$

D. $\frac{x}{3} - 28 = x$

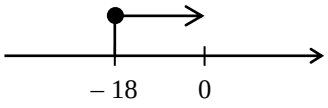
7. Which of the following points lies on the straight line $y = 2x + 6$?

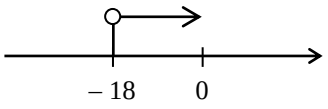
A. (0 , 6)
B. (6 , 0)
C. (0 , – 3)
D. (3 , 0)

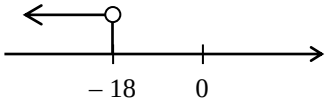
8. If $x > y$, which of the following inequalities is correct?

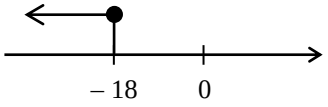
A. $\frac{x}{10} < \frac{y}{10}$
B. $-\frac{x}{10} > -\frac{y}{10}$
C. $10x > 10y$
D. $x - 10 < y - 10$

9. Which of the following diagrams represents $x \geq -18$?

A.


B.


C.


D.


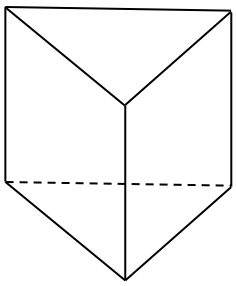
10. Which of the following uses the most suitable unit and degree of accuracy to express the time required of a student going from home to school?

A. 1 hour
B. 1.123 hours
C. 0.05 day
D. 0.046 8 day

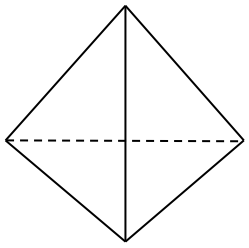
11. The ratio of the surface areas of two similar prisms is 1 : 64. Which of the following is the ratio of their corresponding heights?

A. 1 : 4
B. 1 : 8
C. $1^2 : 8^2$
D. $1^2 : 64^2$

12. The figure shows two solids *I* and *II*. In each solid, the lengths of **ALL** edges are equal.



Solid *I*



Solid *II*

Which of the following choices is correct?

	Solid *I*	Solid *II*
A.	It is a regular polyhedron.	It is a regular polyhedron.
B.	It is **NOT** a regular polyhedron.	It is a regular polyhedron.
C.	It is a regular polyhedron.	It is **NOT** a regular polyhedron.
D.	It is **NOT** a regular polyhedron.	It is **NOT** a regular polyhedron.

13. Figure *P* is changed to Figure *Q* after a single transformation. What is the corresponding transformation?

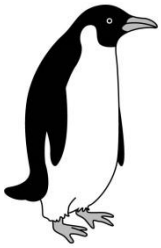


Figure *P*

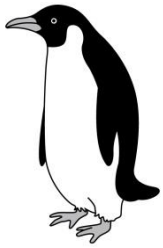
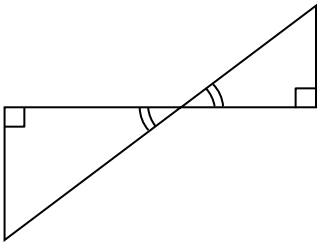


Figure *Q*

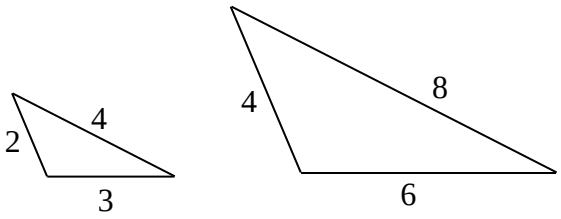
A. Translation
B. Reflection
C. Enlargement
D. Rotation

14. Which of the following pairs of triangles **CANNOT** be similar?

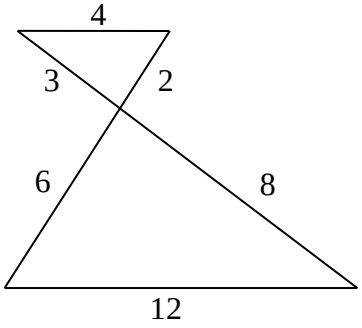
A.



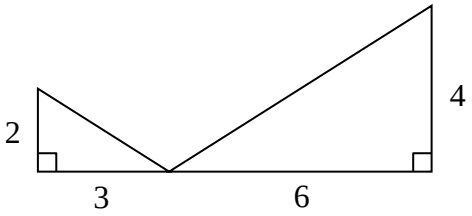
B.



C.



D.



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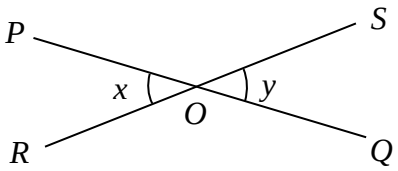
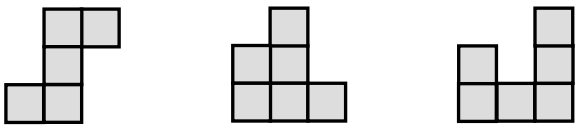
15. In the figure, *POQ* and *ROS* are straight lines. *x* and *y* are



A. vertically opposite angles.
B. angles at a point.
C. corresponding angles.
D. exterior angles.

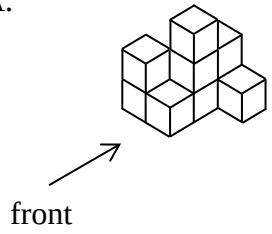
16. The figures below show the 2-D representations of a solid from various views.



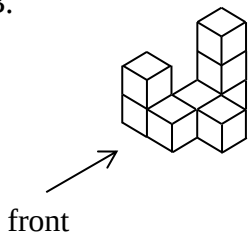
top view front view side view

Which of the following could be the solid?

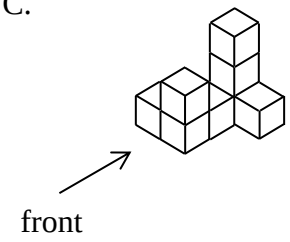
A.



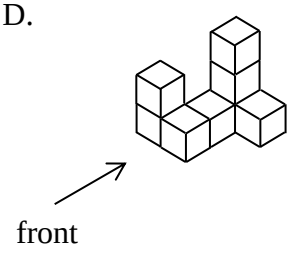
B.



C.

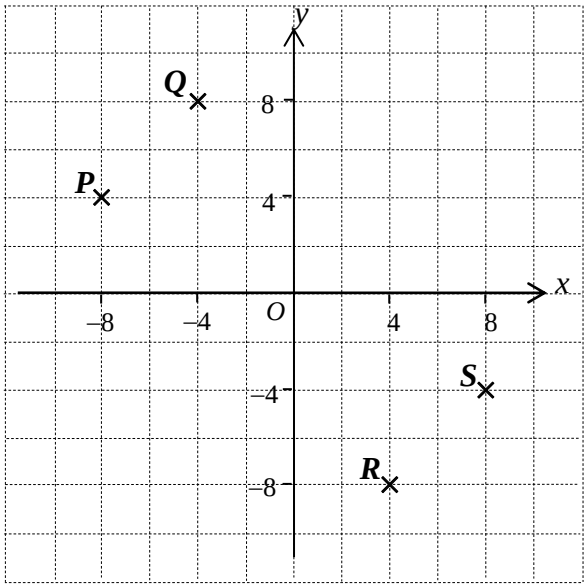


D.

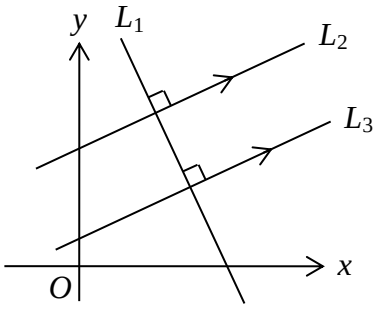


17. In the figure, which point can be represented by (4 , –8)?

A. ***P***
B. ***Q***
C. ***R***
D. ***S***



18. In the figure, the line L_1 is perpendicular to a pair of parallel lines L_2 and L_3.



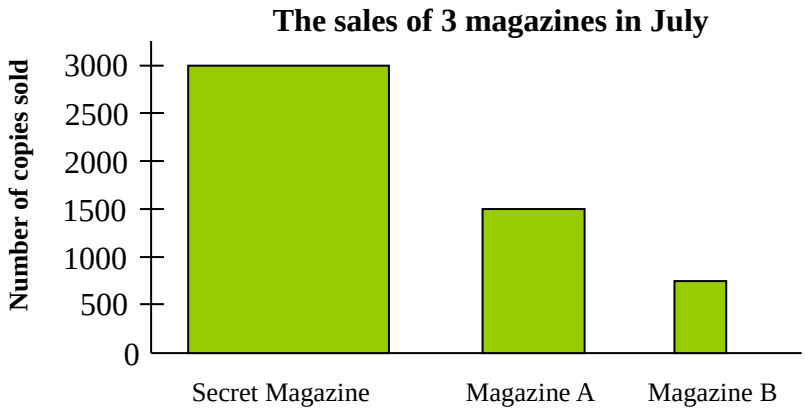
The slope of L_2 is $\frac{2}{3}$. Find the slopes of L_1 and L_3.

	Slope of L_1	Slope of L_3
A.	$-\frac{2}{3}$	$\frac{3}{2}$
B.	$-\frac{2}{3}$	$\frac{2}{3}$
C.	$-\frac{3}{2}$	$\frac{3}{2}$
D.	$-\frac{3}{2}$	$\frac{2}{3}$

19. Professor Chan wants to know the water pollution level of a bay. Which of the following is the most suitable method?

A. Record the number of fishing boats leaving the bay every day.
B. Interview nearby residents randomly by phone.
C. Carry out experiments on the samples of sea water collected from the bay.
D. Check the room prices of hotels near the bay.

20. The diagram below compares the sales of 'Secret Magazine' and 2 other magazines in July.



Based on the diagram above, Jenny believes that the sales of 'Secret Magazine' are 4 times that of Magazine A in July.

Which of the following statements is the best reason that Jenny is misled by the above diagram?

A. The vertical scale starts from zero.
B. The scale of the vertical axis does not take 100 as one unit.
C. The bars do not have the same width.
D. There is no comparison of the sales of other magazines.

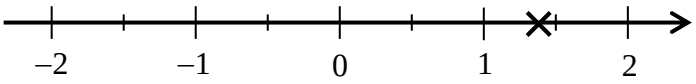
SECTION B: Write ALL the answers in the ANSWER BOOKLET.
Working need not be shown.

21. Danny uses directed numbers to represent the time differences between Hong Kong and other cities. For example,
the local time in City A is 10 hours behind the local time in Hong Kong, the time difference is represented by –10 hours.

Use a directed number to represent each of the following situations:

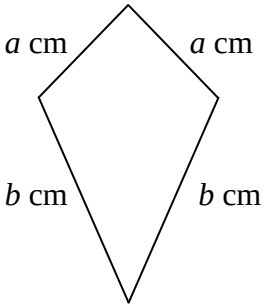
(i) The local time in Paris is 7 hours behind the local time in Hong Kong.
(ii) The local time in Tokyo is 1 hour ahead of the local time in Hong Kong.

22. Use the symbol '×' to mark the number $-\sqrt{3}$ on the number line given in the **ANSWER BOOKLET**.
Example: $\sqrt{2}$ is marked on the number line below.



23. A piece of bread is made by mixing flour and butter in the ratio 7 : 3 by weight. If Susan uses 210 g flour to make the piece of bread, what is the required weight of butter?

24. In the figure, the perimeter of the kite is P cm, where $P = 2a + 2b$.
If $P = 20$ and $b = 8$, find the value of a.

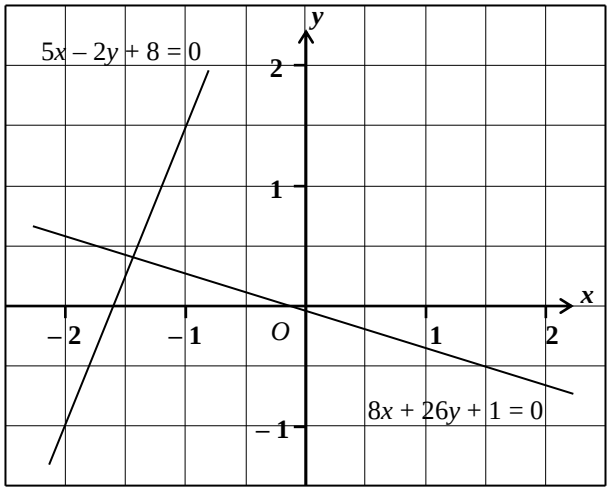


25. The n^{th} term of a sequence is $\frac{1}{2n+1}$. Find the value of the 12^{th} term of the sequence.

26. Expand $x(x-y+1)$.

27. Factorize x^2+6x+8.

28.



The above figure shows the graphs of $5x-2y+8=0$ and $8x+26y+1=0$.

According to the given graphs, (– 1.5 , 0.5) is the * exact solution / approximate solution of the simultaneous equations $\begin{cases}5x-2y+8=0\\8x+26y+1=0\end{cases}$.

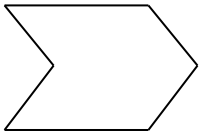
(*Circle the correct answer in the **ANSWER BOOKLET**)

29. Consider the formula $K=\dfrac{2a^2}{b}$. If a = 3 and b = – 2, find the value of K.

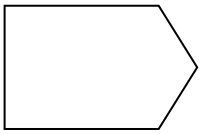
30. The circumference of a circle is 28π cm, find its radius.

31. Which of the following polygons must be concave? (May be more than one answer)

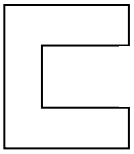
P.



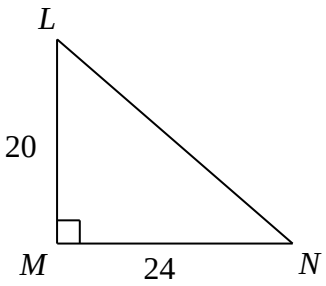
Q.

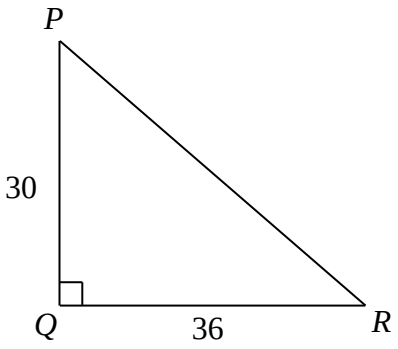


R.



32.





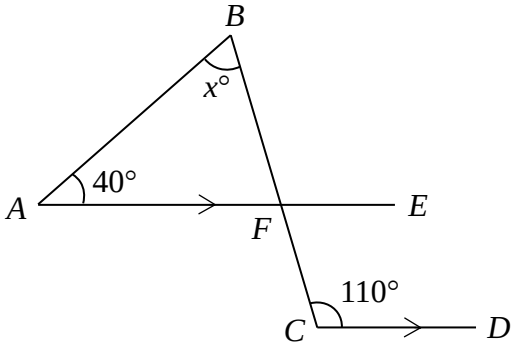
According to the given information in the above figure,

(a) identify whether $\triangle LMN$ and $\triangle PQR$ are congruent or similar triangles, and

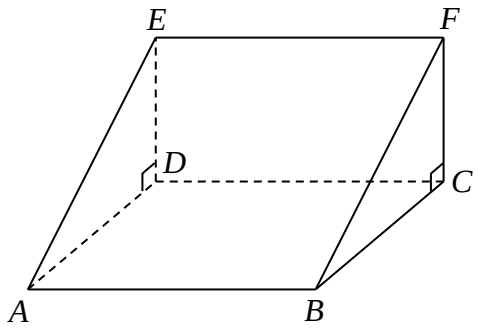
(b) choose the correct reason.

33. In the figure, AE intersects BC at F, $AE \,//\, CD$. $\angle BAE = 40°$ and $\angle BCD = 110°$.

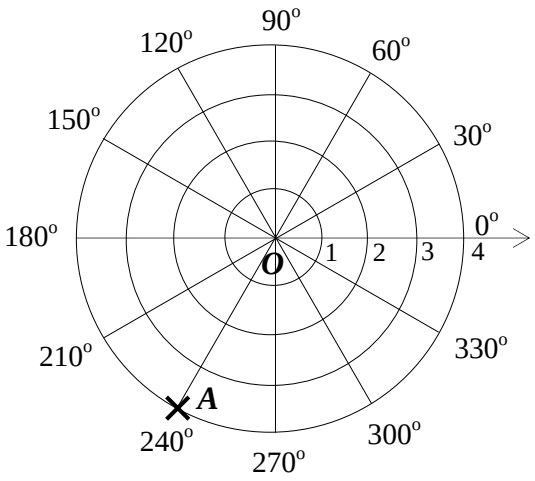
Find the value of x.



34. The figure shows a triangular prism. *ABCD* and *CFED* are rectangles. *ABCD* is a horizontal plane. Name the projection of *BF* on the plane *ABCD*.



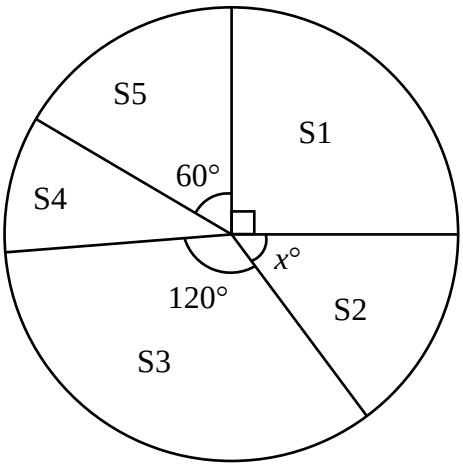
35. Find the polar coordinates of point ***A*** in the figure.



36. Find the distance between two points *A*(14 , 27) and *B*(4 , 3) in a rectangular coordinate plane.

37. The following pie chart shows the class level of the participants of a study tour.

Class level of the participants



According to the above pie chart, answer the following questions.

(a) If $\frac{3}{20}$ of the participants are S2 students, find the value of x.

(b) If the number of S5 participants is 10, find

(i) the total number of participants,

(ii) the number of S1 participants.

38. The table below shows the prices of 50 washing machines.

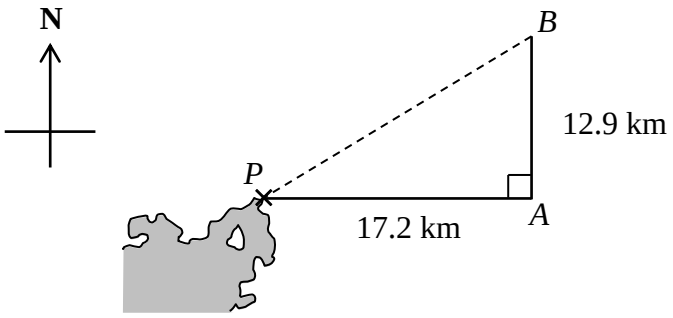
Price ($)	3000 – 3999	4000 – 4999	5000 – 5999	6000 – 6999
Frequency	5	15	20	10

From the above information, find the modal class of the prices of the washing machines.

39. There are 2 multiple choice questions in a test. Each question has 2 choices and only one of the choices is the correct answer. If Eva selects one choice in each question randomly, find the probability that she gets all correct answers in these 2 questions.

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. A ship leaves *P* and sails 17.2 km due east to *A*. Then it sails 12.9 km due north to *B*. Find the distance between *P* and *B*.



41. The value of a ring increases by 10% per year. Kitty bought the ring for \$54 800 two years ago. Find the present value of the ring.

42. Solve the simultaneous equations $\begin{cases} y = 4x + 9 \\ y = 3x + 1 \end{cases}$.

43. The following data show the time taken by 20 athletes to finish a 400 m running race (correct to the nearest s).

69	54	71	57	67
57	59	64	66	59
79	75	61	68	55
61	58	52	62	63

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

44. Complete the table for the equation $y = -\frac{x}{3} + 1$ in the **ANSWER BOOKLET**.

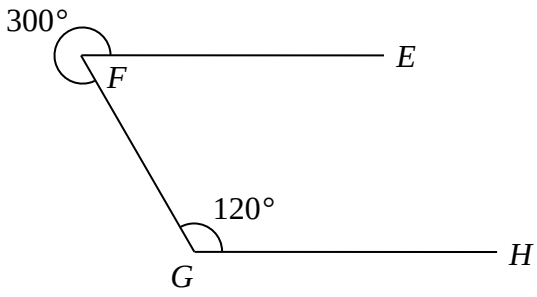
x	-3	0	3
y	2		

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

45. S1-S3 students of a secondary school are going to visit a museum. The numbers of participating students in S1, S2 and S3 are 11, 32 and 63 respectively. If the total number of participating students of the school is 100 or above, they can be given a group discount.

Give **an appropriate approximation** for the number of participating students in each form. Estimate the total number of participating students and judge whether they can get the group discount.

46. In the figure, reflex $\angle EFG = 300°$, $\angle FGH = 120°$. Prove that $FE // GH$.



47. The following frequency distribution table shows the high jump records of 80 students.

Height (cm)	106 – 110	111 – 115	116 – 120	121 – 125	126 – 130
Class Mark (cm)	108	113	118	123	128
Number of students	12	18	30	11	9

According to the above data, complete the frequency polygon in the **ANSWER BOOKLET**.

END OF PAPER

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Answers written on this page will not be marked.

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