9	M	E	2	(	Q	)

Education Bureau

Territory-wide System Assessment 2013

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	=	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.

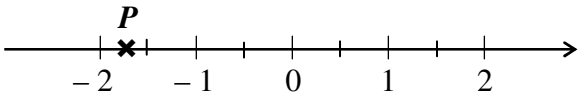
1. Calculate $-6+3(-2)$.

A. -12
B. -5
C. 0
D. 6

2. Round off $0.048\,076$ to 3 decimal places.

A. 0.05
B. 0.048
C. $0.048\,1$
D. $0.048\,08$

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



A. $-\frac{9}{4}$
B. $-\frac{4}{3}$
C. $-\sqrt{2}$
D. $-\sqrt{3}$

4. Which of the following is a polynomial?

A. $2^x + 3x + 1$

B. $\frac{1}{x^2} + 3x + 1$

C. $x^2 + 3x + 1$

D. $x^2 + 3\sqrt{x} + 1$

5. Simplify $5y^4 - 2y^4$.

A. $3y^4$

B. $3y$

C. 3^4

D. 3

6. Which of the following is an equation with the root 100?

A. $\frac{x+90}{10} = \frac{x}{100}$

B. $\frac{x+90}{-10} = \frac{x}{100}$

C. $\frac{x-90}{10} = \frac{x}{100}$

D. $\frac{x-90}{-10} = \frac{x}{100}$

7. The prices of a set of sportswear and a pair of sports shoes are \$$x$ and \$$y$ respectively. The price of a set of sportswear is higher than that of a pair of sports shoes by \$250. The price of 2 sets of sportswear is just equal to the price of 3 pairs of sports shoes. Which of the following pairs of simultaneous equations shows the relation between x and y ?

A. $\begin{cases} x - y = 250 \\ 3x = 2y \end{cases}$

B. $\begin{cases} x - y = 250 \\ 2x = 3y \end{cases}$

C. $\begin{cases} y - x = 250 \\ 3x = 2y \end{cases}$

D. $\begin{cases} y - x = 250 \\ 2x = 3y \end{cases}$

8. Which of the following is an identity?

A. $3x + 6x = 18x$

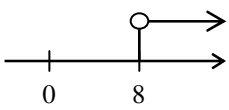
B. $3x - 6 = 6 - 3x$

C. $3x + 6 = 3(x + 6)$

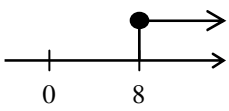
D. $3x - 6x = 6x - 9x$

9. Which of the following diagrams represents $x \geq 8$?

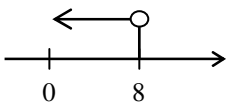
A.



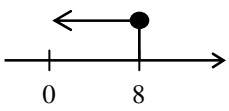
B.



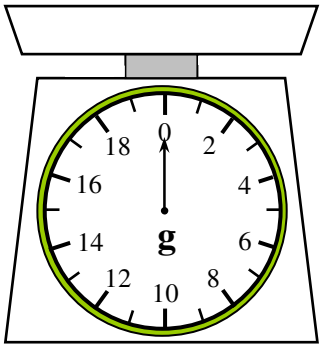
C.



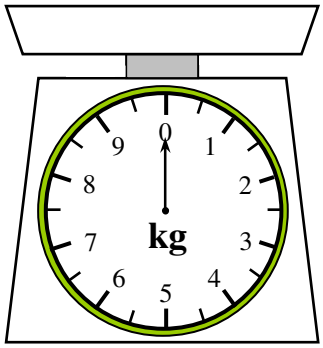
D.



10.



Scale *A*

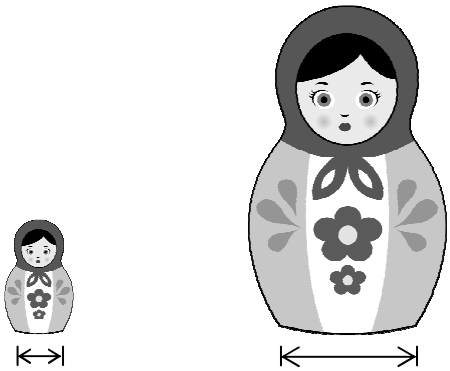


Scale *B*

The above figure shows scale *A* and scale *B*. Connie wants to find the weight of a toothpick. Which of the following methods is the best?

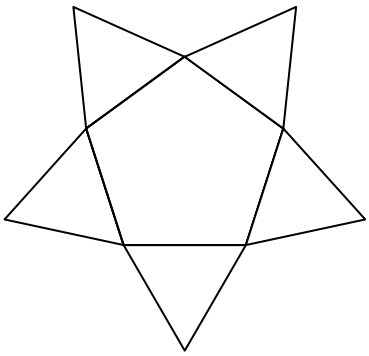
A. Connie uses scale *A* to measure the weight of 100 toothpicks and then divides the weight by 100.
B. Connie uses scale *B* to measure the weight of 100 toothpicks and then divides the weight by 100.
C. Connie uses scale *A* to measure the weight of 2 toothpicks and then divides the weight by 2.
D. Connie uses scale *B* to measure the weight of 2 toothpicks and then divides the weight by 2.

11. In the figure, the two dolls are similar solids. Their bases are circles and the base diameters are 2 cm and 6 cm respectively. The volume of the smaller doll is 10 cm^3. Find the volume of the bigger doll.

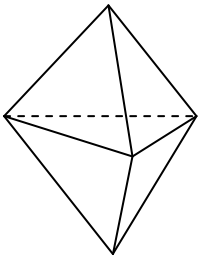


A. 30 cm^3
B. 90 cm^3
C. 270 cm^3
D. 1 000 cm^3

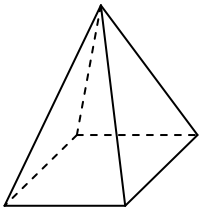
12. Which of the following 3-D figures can be made by the net on the right?



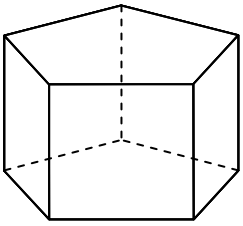
A.



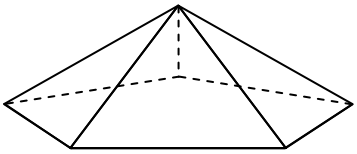
B.



C.



D.



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

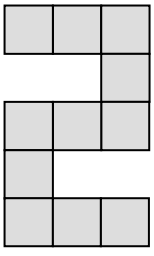


Figure *X*

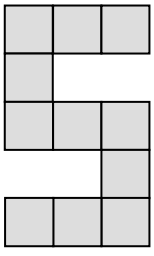
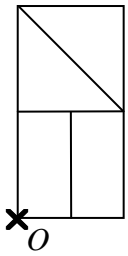


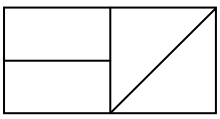
Figure *Y*

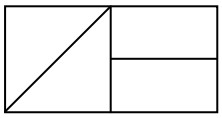
A. Reflection
B. Rotation
C. Enlargement
D. Translation

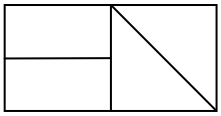
14.

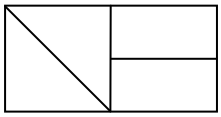


Find the image of the above figure after rotating about O through 90° in an anticlockwise direction.

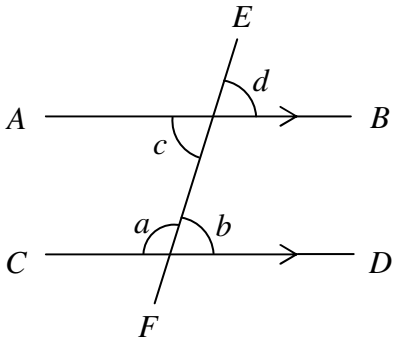
A. 

B. 

C. 

D. 

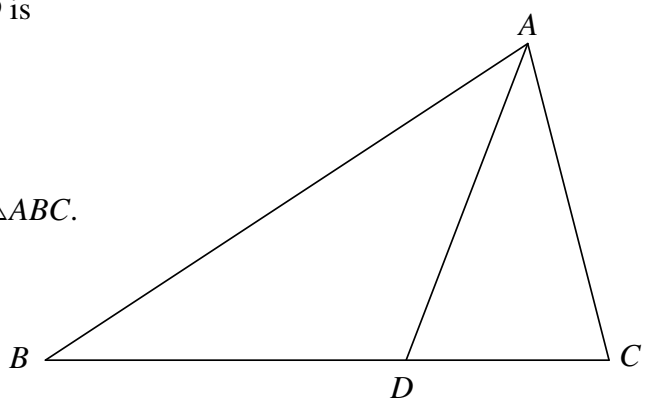
15. In the figure, AB // CD and EF is a straight line. Which of the following is a pair of corresponding angles?



A. a and c
B. b and c
C. b and d
D. c and d

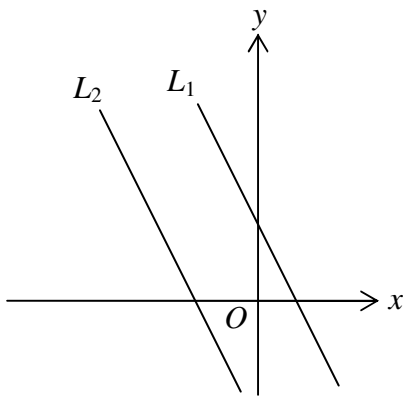
16. In $\triangle ABC$, $\angle BAD = \angle CAD$. AD is

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



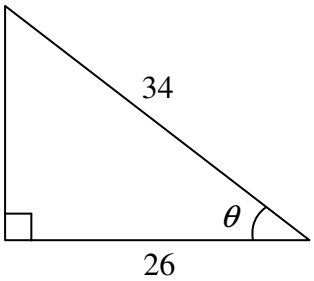
17. In the figure, the slope of line L_1 is -2. Line L_2 is parallel to L_1.
Find the slope of L_2.

A. -2
B. $-\frac{1}{2}$
C. $\frac{1}{2}$
D. 2



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

A. 53°
B. 50°
C. 40°
D. 37°



19. Which of the following data is discrete?

A. The weights of 80 apples
B. The heights of 120 students
C. The finishing time of 2000 runners in a marathon race
D. The number of family members in 60 families

20. In which of the following sets of data, is the median 70 and the mode 50?

A. 50, 50, 70, 50, 50
B. 50, 70, 70, 70, 50
C. 50, 90, 70, 50, 50
D. 50, 90, 70, 80, 50

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

21. Irene uses directed numbers to represent the changes of the Hang Seng Index.
For example,
+150 points represents a rise of 150 points of the Hang Seng Index.
0 points represents no change in the Hang Seng Index.

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

(i) A rise of 350 points
(ii) A drop of 300 points

22. Calculate $\frac{-4-2}{-2+4}$.

23. The length of a bacterium is about 0.000 003 m. Use scientific notation to represent this number.

24. During the 2012 Olympics in London, the numbers of medals won by Germany and the United States were in the ratio 11 : 26. If the United States won 104 medals, find the number of medals won by Germany.

25. Consider the sequence of triangular numbers.

1 , 3 , 6 , 10 , 15 , x , …

Find the value of x.

26. Simplify $(5a-4b)-(3b-4a)$.

27. When $(x+3)(x+4)(x+5)$ is expanded, the result is $x^3+12x^2+47x+60$.
What is the result when $x^3+12x^2+47x+60$ is factorized?

28. Factorize x^2+2x-8.

29. Solve $\frac{x-6}{3} = x$.

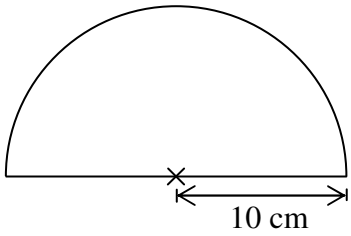
30. Simplify $\frac{1}{y} - \frac{1}{4y}$.

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

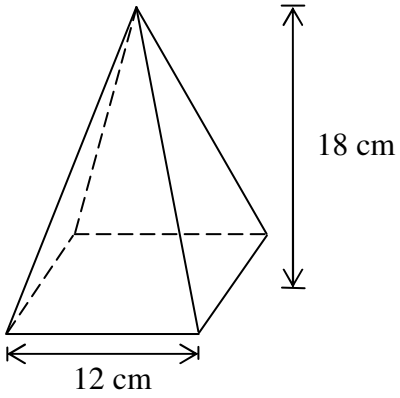
i. -99 ☐ -100

ii. $\frac{1}{99}$ ☐ $\frac{1}{100}$

32. The following figure is a semi-circle of radius 10 cm. Find the area of the figure and express the answer in terms of π.

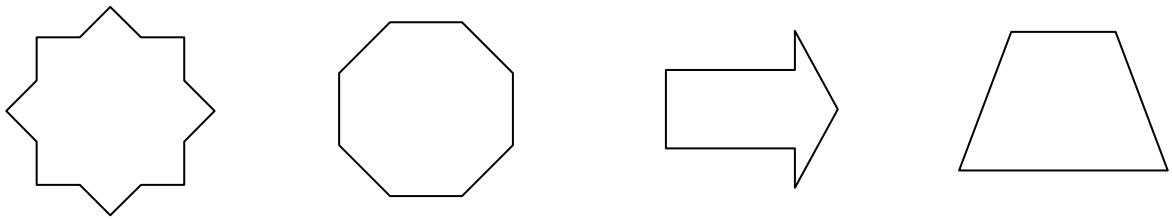


33. The height of the pyramid in the figure is 18 cm. Its base is a square of side 12 cm. Find the volume of the pyramid.

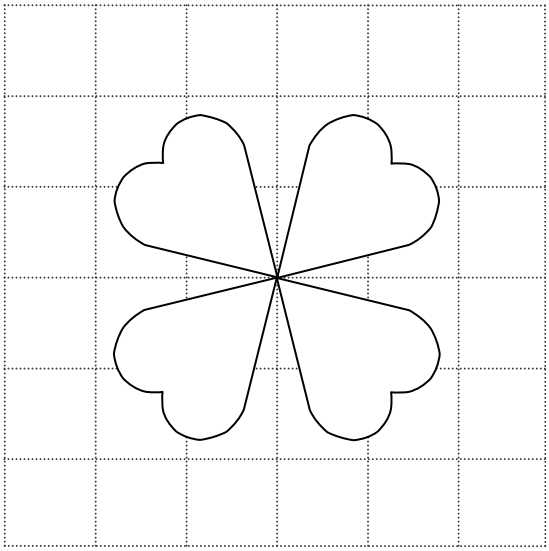


34. Which of the following polygons is / are convex? (May be more than one answer)

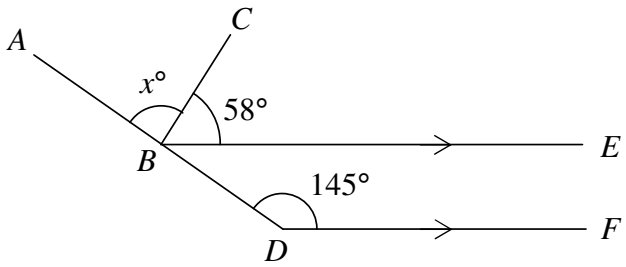
P. Q. R. S.



35. Draw **ALL** axes of symmetry of the following figure in the **ANSWER BOOKLET**.



36. In the figure, ABD is a straight line, $BE \,//\, DF$, $\angle CBE = 58°$ and $\angle BDF = 145°$. Find the value of x.



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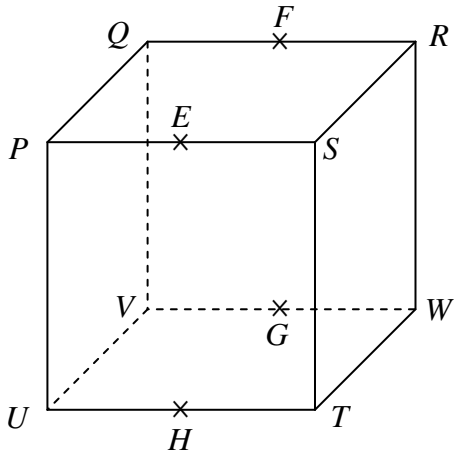
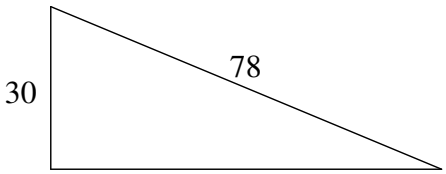
37. The figure shows a cube $PQRSTUVW$. E, F, G and H are the mid-points of PS, QR, VW and UT respectively. Name an axis of rotational symmetry containing point E.

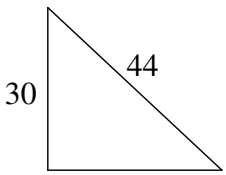


38. Which of the following must be right-angled triangle(s)? (May be more than one answer)

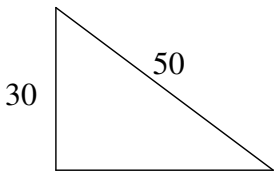
Triangle D



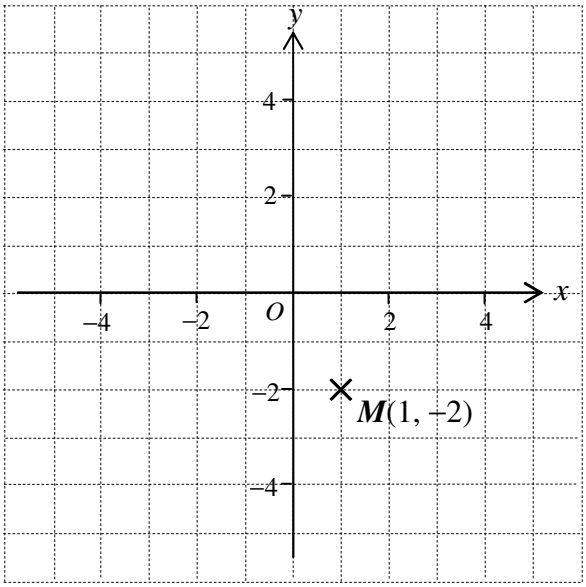
Triangle E



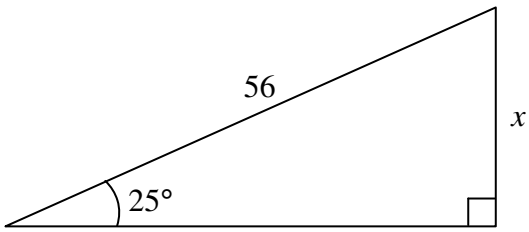
Triangle F



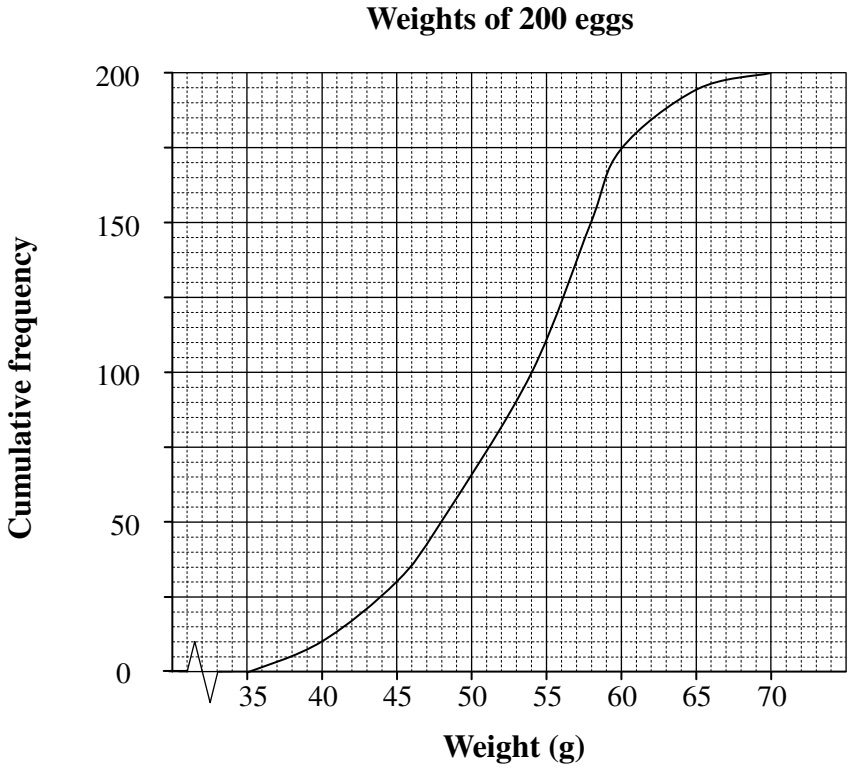
39. $\boldsymbol{M}(1\ ,-2)$ is translated 5 units to the left to $\boldsymbol{M'}$. Find the coordinates of $\boldsymbol{M'}$.



40. Find the value of x in the figure. (Correct to 3 significant figures)



41. The following cumulative frequency curve shows the weights of 200 eggs.



Find the median weight of the eggs.

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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 computer room was opened for 20 school days in March. The data below shows the number of users each day.

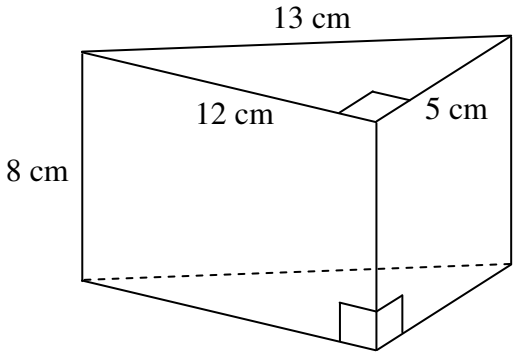
43	56	38	27	13
23	35	52	18	45
57	16	39	48	34
21	24	47	33	54

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

43. Terry bought a tablet computer for \$5 600. He then sold it for \$7 280. Find the profit per cent.

44. Martin deposited \$$P$ in a bank at an interest rate of 4% p.a. compounded yearly. The amount he received after 2 years was \$6 760. Find the value of P.

45. The figure shows a solid triangular prism. Its base is a right-angled triangle. Find the total surface area of the prism.



46. (a) Simplify $x^2 \cdot x^5$ and express the answer with positive index.

(b) Simplify $\dfrac{y^{-3}}{x^2 \cdot x^5}$ and express the answer with positive index.

47. Complete the table for the equation $2x - y - 1 = 0$ in the **ANSWER BOOKLET**.

x	-2	0	2
y			3

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

48. The table below shows the waiting time of 50 university students at a shuttle bus stop.

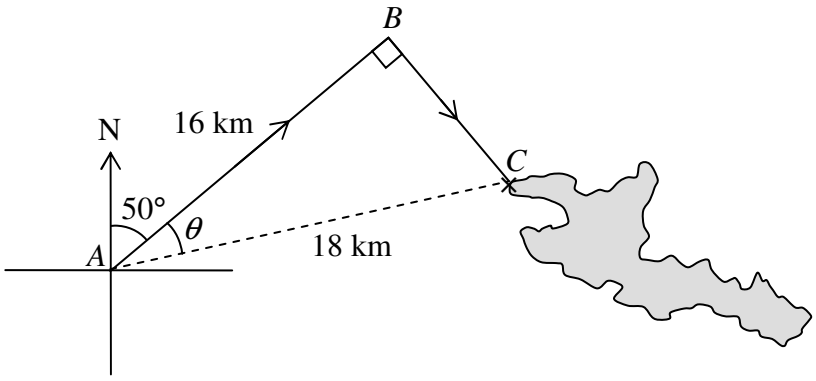
Waiting time (min)	Number of students
11 – 15	8
16 – 20	28
21 – 25	14

Find the mean waiting time of the 50 students (in min).

49. In the figure, a fishing boat sails 16 km from pier A to B and the compass bearing of B from A is N50°E. The boat then turns 90° to its right and sails to pier C. It is known that the distance between A and C is 18 km.

(a) Find the value of θ. (Correct to the nearest degree)

(b) Find the compass bearing of C from A. (Correct to the nearest degree)



50. According to a doctor's advice, Catherine took some medicine, 10 mL each time. Figure 1 shows the original amount of the medicine and Figure 2 shows the amount of the medicine left after taking it 5 times. Estimate the original amount of the medicine and explain your estimation method.

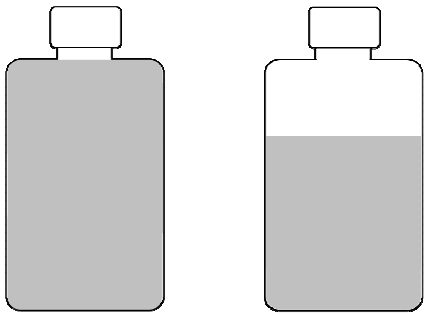


Figure 1 Figure 2

END OF PAPER

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