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Education Bureau

Territory-wide System Assessment 2018

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	$= 2\pi r \times \dfrac{\theta}{360^{\circ}}$
	Area	$= \pi r^2 \times \dfrac{\theta}{360^{\circ}}$
Sphere	Surface area	$= 4\pi r^2$
	Volume	$= \dfrac{4}{3}\pi r^3$
Cylinder	Curved surface area	$= 2\pi rh$
	Volume	$= \pi r^2 h$
Cone	Curved surface area	$= \pi rl$
	Volume	$= \dfrac{1}{3}\pi r^2 h$
Prism	Volume	$=$ base area $\times$ height
Pyramid	Volume	$= \dfrac{1}{3} \times$ base area $\times$ height

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

1.   It is given that the unit digit of a two-digit number is 0 .   It is now multiplied by another two-digit number.   Which of the following can be the product?

      A.   90
      B.   508
      C.   750
      D.   10 000

$$\begin{array}{r} \boxed{}\,0 \\ \times\ \boxed{}\boxed{} \\ \hline \boxed{\text{Product}} \end{array}$$
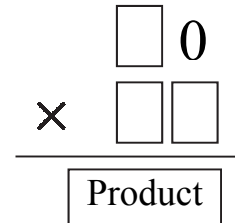
2.   Determine whether a rate or a ratio should be used to relate the quantities in each of the following statements.

      (i)   The length, width and depth of a swimming pool are 50 m, 25 m and 2 m respectively.
      (ii)   20 m^3 of water can be poured into a swimming pool in 5 minutes.

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

3.   The price of a bottle of orange juice is $x and the price of a bottle of milk is $y .   Mary pays $500 to buy 3 bottles of orange juice and 4 bottles of milk.   What is the change?

      A. $(500 - 3x - 4y)$

      B. $(500 - 3y - 4x)$

      C. $(3x + 4y - 500)$

      D. $(3y + 4x - 500)$

4. Simplify $(a^3 b^4)^2$.

    A. $a^6 b^8$

    B. $a^5 b^6$

    C. $a^3 b^8$

    D. ab^{14}

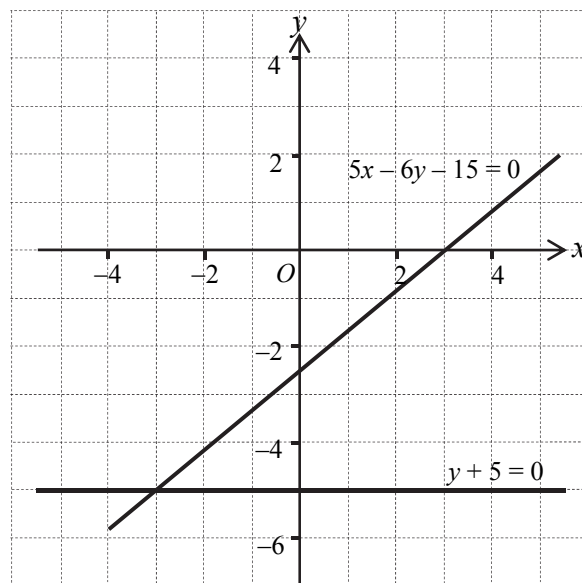5. Which of the following points lies on the straight line $x - y - 1 = 0$?

    A. (–2, 3)

    B. (2, 3)

    C. (3, –2)

    D. (3, 2)

6.

The above figure shows the graphs of $5x - 6y - 15 = 0$ and $y + 5 = 0$.

According to the given graphs, solve the simultaneous equations $\begin{cases} 5x - 6y - 15 = 0 \\ y + 5 = 0 \end{cases}$ graphically.
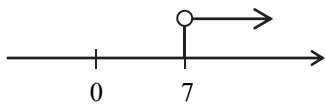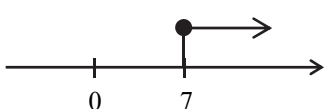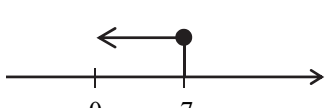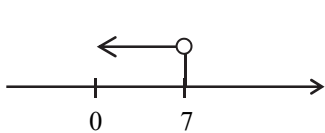
    A. (3, 0)

    B. (0, –5)

    C. (–3, –5)

    D. (–5, –3)

7. A music concert has two types of tickets costing $200 and $120 each. Mr Chan spends $2 360 to buy 15 tickets, in which the number for the $200 tickets is x, the remaining are the $120 tickets. Which of the following equations can be used to find the value of x?

   A. $120x + 200x = 2360$

   B. $200x + 120 \times 15 = 2360$

   C. $120x + 200(15 - x) = 2360$

   D. $200x + 120(15 - x) = 2360$
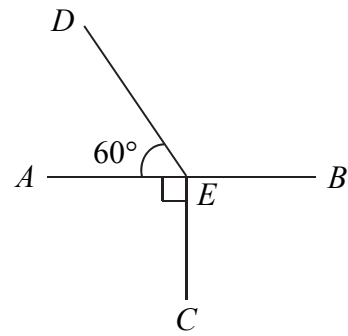
8. Which of the following diagrams represents $x < 7$?

   A.
      0   7

   B.
      0   7

   C.
      0   7

   D.
      0   7

9. The length of a school hall is 34 m (correct to the nearest m). Which of the following could be its actual length?

   A. 33.4 m

   B. 33.5 m

   C. 34.5 m

   D. 35.4 m

10. In the figure, *AEB* is a straight line. Which of the following is an obtuse angle?
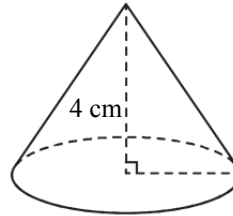
A. ∠*AEB*

B. ∠*AEC*

C. ∠*AED*

D. ∠*CED*

11. In the figure, Cone *A* and Cone *B* are similar solids. Their heights are 12 cm and 4 cm respectively. The total surface area of Cone *A* is $108\pi\,\text{cm}^2$. Find the total surface area of Cone *B*.
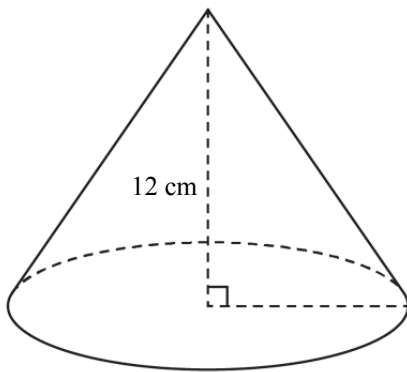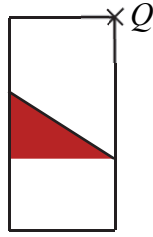
A. $36\pi\,\text{cm}^2$

B. $18\pi\,\text{cm}^2$

C. $12\pi\,\text{cm}^2$

D. $4\pi\,\text{cm}^2$

12.

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

A.

B.
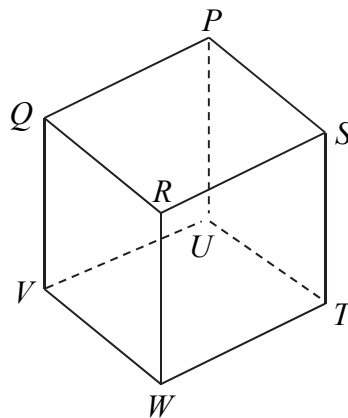

C.

D.
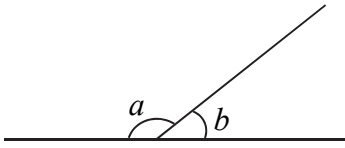

13. The figure shows a cube $PQRSTUVW$. Which of the following is a plane of reflectional symmetry of the cube?
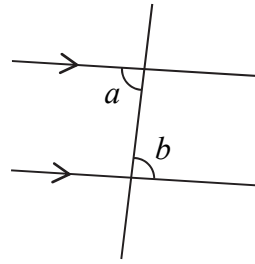

A. $PSTU$

B. $QSTV$

C. $RSTW$

D. $SPQR$

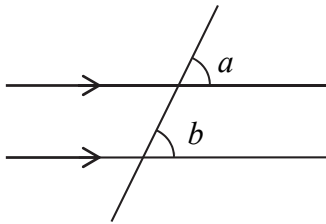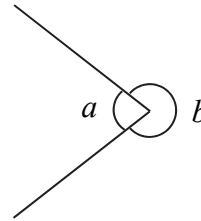14. Which of the following figures shows that a and b are angles at a point?

A.

B.
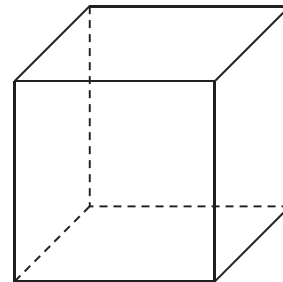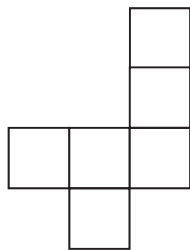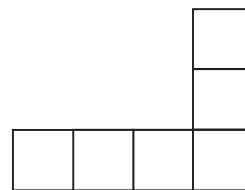

C.

D.

15. Which of the following nets can be folded into a cube?

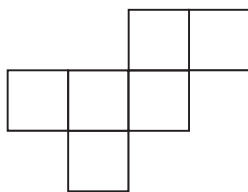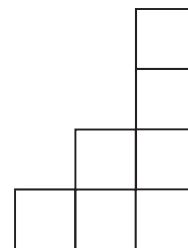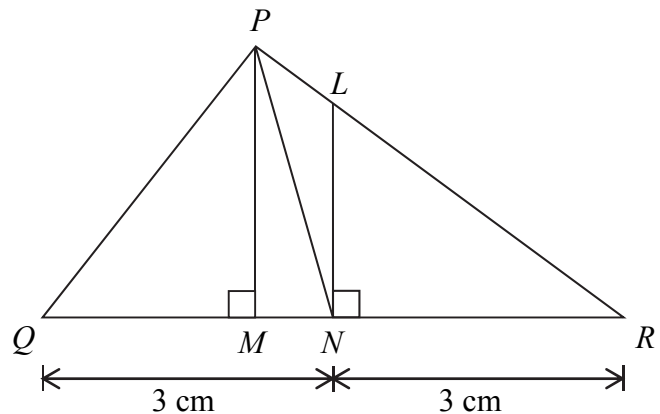

A.

B.

C.

D.

16. In the figure, *PLR* and *QMNR* are straight lines. Consider △*PQR*, *QN* = *NR* = 3 cm. *PM* ⊥ *QR* and *LN* ⊥ *QR*. Which of the following is a median of △*PQR* ?

    A. *LN*

    B. *PN*

    C. *PM*

    D. *QM*

17. *A* (11, 13) and *B* (8, 4) are two points in the rectangular coordinate plane. The coordinates of the mid-point of *AB* =
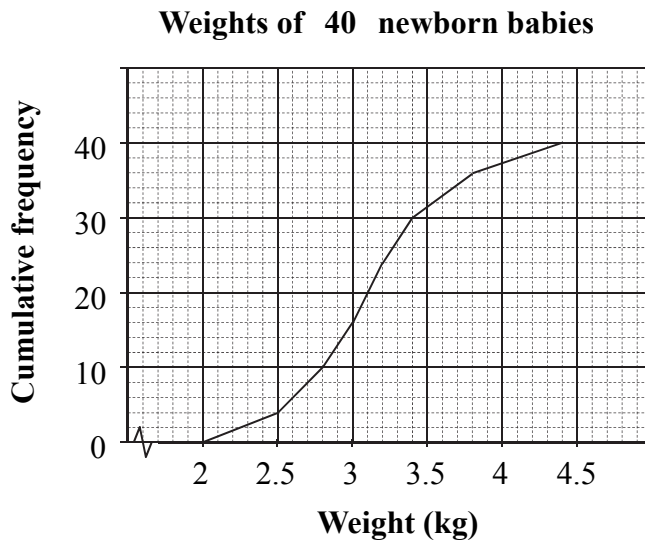
    A. $(11+8, 13+4)$.

    B. $\left(\dfrac{11+8}{2}, \dfrac{13+4}{2}\right)$.

    C. $(11-8, 13-4)$.

    D. $\left(\dfrac{11-8}{2}, \dfrac{13-4}{2}\right)$.

18. Find the value of $\tan\theta$ in the figure.

    A. $\dfrac{12}{35}$

    B. $\dfrac{35}{12}$

    C. $\dfrac{12}{37}$

    D. $\dfrac{35}{37}$
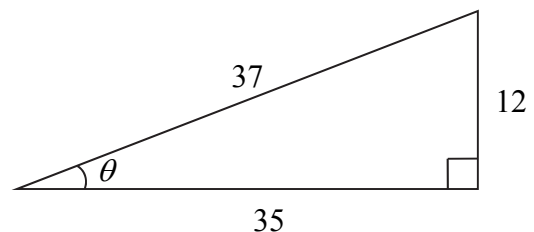
19. The cumulative frequency polygon below shows the weights of 40 newborn babies.

Weights of 40 newborn babies

Find the lower quartile of the weights of the 40 newborn babies.

A. 2.8 kg
B. 3.4 kg
C. 10 kg
D. 30 kg

20. Student Union investigates the students' opinions on the food quality of the school tuck shop. Which of the following is the most suitable method to collect data?

A. Conduct a survey of all students using questionnaires.
B. Interview the school principal.
C. Search the opening hours of the tuck shop last month.
D. Observe and record the number of students buying food at the tuck shop during recess on a day.

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

21. Stephen uses directed numbers to represent the rise and drop in the water level of a reservoir.
    For example,
    +3 cm represents the water level of a reservoir has risen by 3 cm.
    Use a directed number to represent each of the following situations:

    (i)   The water level of Pok Fu Lam Reservoir has risen by 5 cm.
    (ii)   The water level of Shing Mun Reservoir has dropped by 4 cm.

22. Round off 0.036 58 to 3 decimal places.

23. How many positive integers are less than $\sqrt{20}$?

24. Figure 1 to Figure 4 consist of 2 , 4 , 6 and 8 dots respectively.

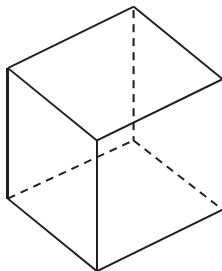|	
Figure 1	⬤ ⬤
Figure 2	⬤⬤ ⬤⬤
Figure 3	⬤⬤⬤ ⬤⬤⬤
Figure 4	⬤⬤⬤⬤ ⬤⬤⬤⬤

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

25. Expand $a(5a-b)$.

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

27. Factorize $x^2+10x+9$.

28. The figure shows the diagram of a cube:

Referring to the sketch shown above, add 2 solid lines and 1 dotted line in the figure provided in the **ANSWER BOOKLET** so as to form a diagram of a **triangular prism**.

29. Consider the formula $a=\dfrac{v^2}{r}$. If $a=4$ and $v=6$, find the value of r.

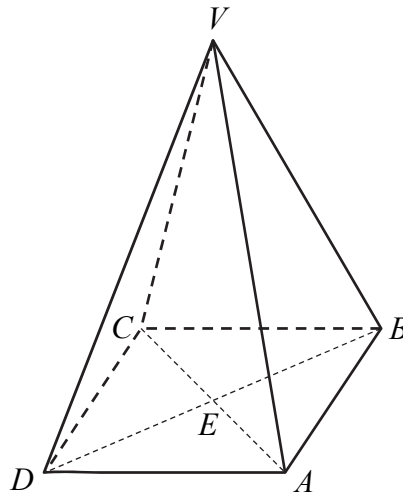30. In the **ANSWER BOOKLET**, fill in the box with $>$ or $<$ to express the relation between the numbers.

$$-\frac{1}{5} \qquad \boxed{} \qquad -100$$

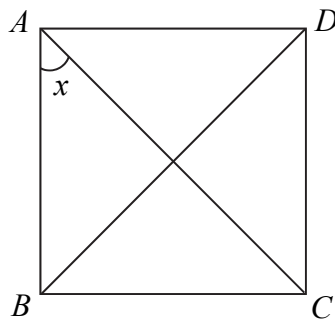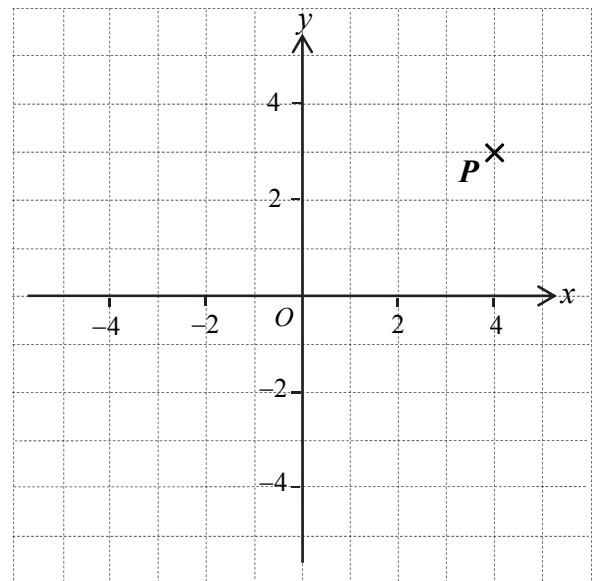31. In the figure, BCD is a straight line and $BC = AC = AD$. Find y.

12
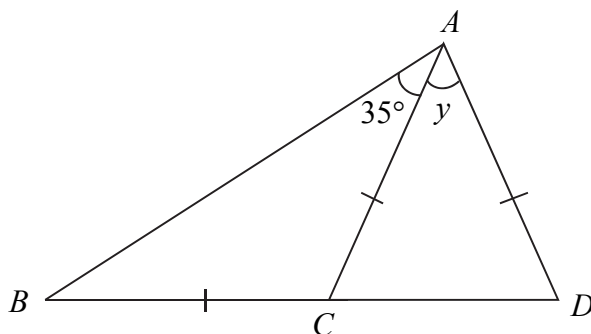
32. *VABCD* is a right pyramid with a square base *ABCD*. *ABCD* is a horizontal plane. *E* is the point of intersection of *AC* and *BD*. Name the angle between *VA* and the plane *ABCD*.
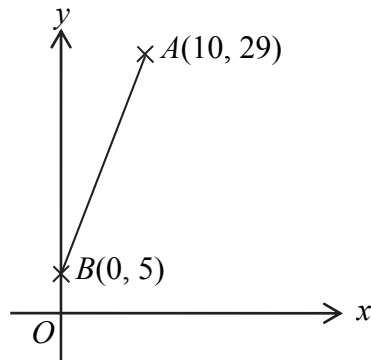

33. In the figure, *ABCD* is a square. *AC* and *BD* are diagonals. Find *x*.

34. Find the coordinates of point ***P*** in the figure.

35. Find the distance between two points $A(10, 29)$ and $B(0, 5)$ in the rectangular coordinate plane.

36. Counselling Master is doing a survey regarding the interpersonal relationships of junior form students. The survey is conducted in the following four stages.

(1) Give questionnaires about the interpersonal relationships to the junior form students.
(2) Analyse the data and the statistical charts to draw conclusions.
(3) Collect the questionnaires and organise the data obtained.
(4) According to the organised data, construct suitable statistical charts.

Arrange these stages in correct order. For example: (1) → (2) → (3) → (4)

37. Betty joins a cooking competition. The following table shows the weight of each marking item and her marks in these items.

	Marking item			
	Nutrition	Creativity	Taste	Appearance
Mark	74	90	86	78
Weight	30%	20%	40%	10%

Find the weighted mean mark of Betty.

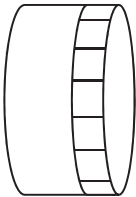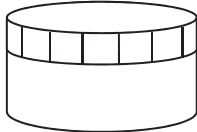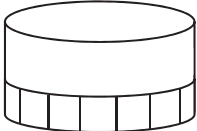38. The stem-and-leaf diagram below shows the distribution of the ages of the workers in a company:

Ages of the workers in a company

Stem (10)	Leaf (1)
2	4 7 7 7
3	0 1 3 5 7 9
4	0 3
5	1 2 6 6 8

According to the above stem-and-leaf diagram, answer the following questions.

(a) How many workers are there in the company?

(b) Find the mode of the ages of the workers.

(c) If the company provides an extra travel allowance for the workers who are over 55 years old, how many workers can obtain the allowance?

39. Thomas tosses a cylindrical box on a table.   There are only 3 possible outcomes as shown below:

Box cover faces sideways	Box cover faces up	Box cover faces down

The outcomes of tossing the cylindrical box 300 times are as follows:

| Outcome	Box cover faces sideways	Box cover faces up	Box cover faces down
Frequency	61	113	126

Find the empirical probability of getting "box cover faces sideways".

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.   Danny deposits $3 125 in a bank.   The interest rate is 4% p.a. **compounded** yearly.
Find the amount he will receive after 2 years.

41.   The figure shows a right cylinder.   Its base radius is 8 cm and its height is 20 cm.
Find the volume of the cylinder.   Express the answer in terms of π.
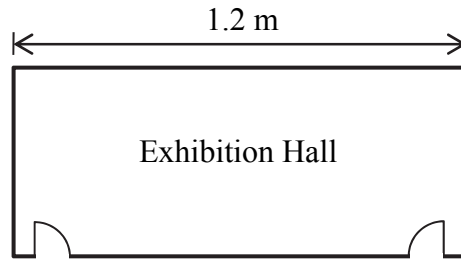
20 cm

8 cm
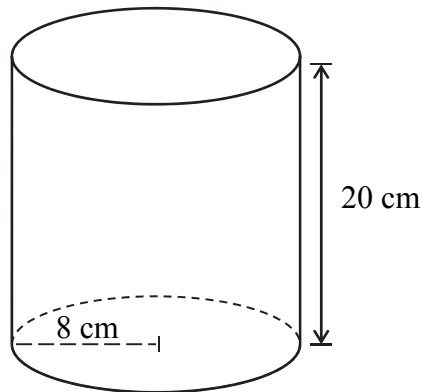
42.   Find the area of the parallelogram in the figure.
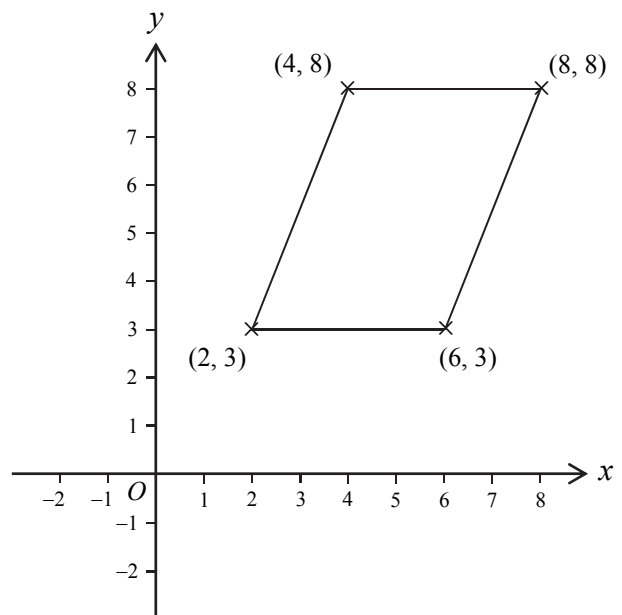
43. The following figure shows the floor plan of an exhibition hall with a scale of 1 : 60 . The length of the hall in the figure is 1.2 m . Find the **actual length** of the exhibition hall.

1.2 m

Exhibition Hall

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

| x	−2	2	4
y		0	

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

45. The figure shows a stamped postcard. The length and width of the stamp are 3 cm and 4 cm respectively. Estimate the area of the postcard and explain your estimation method.

3 cm

$5

4 cm
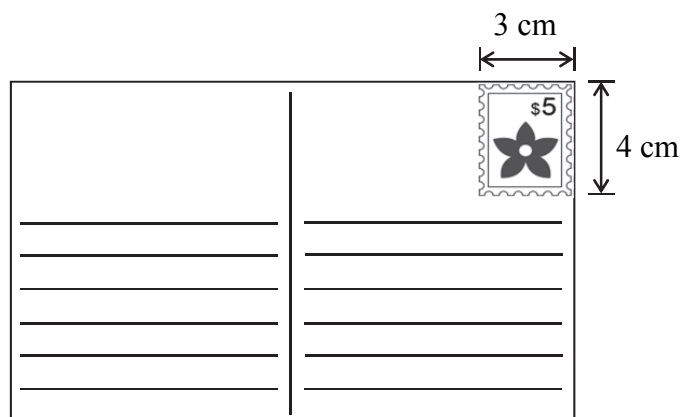
46. In the figure, *DBE* and *FBG* are straight lines. ∠*DBF* = 62°, ∠*CBE* = 58° and ∠*BGE* = 60°. Prove that *BC* // *GE*.
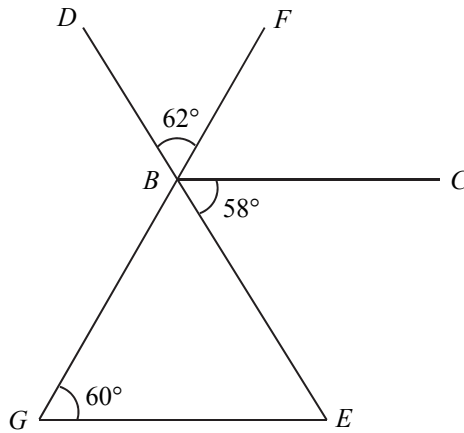
47. The table below shows the amount raised by 40 students taking part in a charity walk.

Amount ($)	100 – 124	125 – 149	150 – 174	175 – 199
Frequency	8	14	16	2

   (a) According to the above table, complete the frequency distribution table in the **ANSWER BOOKLET**.
   (b) Find the mean of the amount raised by the 40 students.

END OF PAPER

Do not write on this page.

Answers written on this page will not be marked.

20