| 9 | M | E | 4 | (| 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 $= 2\pi r \times \dfrac{\theta}{360^{\circ}}$

                  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.   Emily went to a bookshop and bought 5 books.   The prices of all the books were the same.   The price of each book was between $10 and $20.   After she went home, she found that the receipt was made dirty and some digits could not be read.


```
                    XX Bookshop    ┌──────────┐
                                   │ Receipt  │
                                   └──────────┘

        5 books

        Price of each book：$   1█.██
        ─────────────────────────────────────
                          Total：$   ██.50
```

Which of the following **CANNOT** be the total amount of these 5 books?

   A. $ 99.50
   B. $ 69.50
   C. $ 51.50
   D. $ 49.50

2.   The largest integer smaller than $\sqrt{161}$ is

   A.   12.
   B.   13.
   C.   40.
   D.   80.

3. $-x-x-x-x$ =

   A.   0.
   B. $(-x)^4$.
   C. $-4x$.
   D. $4-x$.

4. Paul bought 4 movie tickets and the price of each was y. He paid $\$x$ and the change was $40. Which of the following equations represents the relationship between x and y?

    A. $x + 4y = 40$
    B. $x - 4y = 40$
    C. $y + 4x = 40$
    D. $y - 4x = 40$

5. $\left(-2x^4\right)\left(5x^3\right) =$

    A. $-10x^{12}$.
    B. $-10x^{7}$.
    C. $10x^{12}$.
    D. $10x^{7}$.

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

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

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

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

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

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.
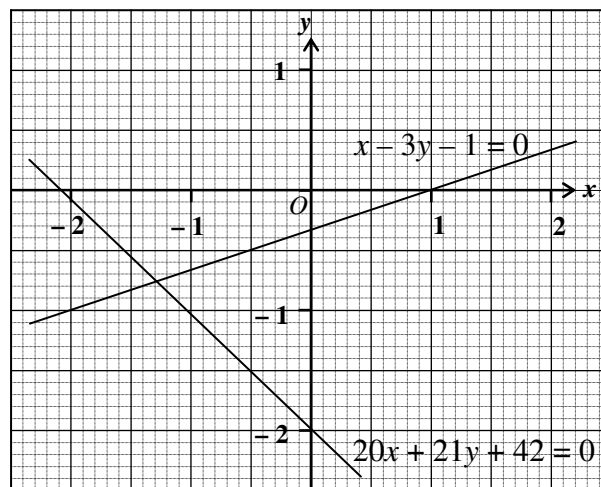
The above figure shows the graphs of $x - 3y - 1 = 0$ and $20x + 21y + 42 = 0$.

Solve the simultaneous equations $\begin{cases} x - 3y - 1 = 0 \\ 20x + 21y + 42 = 0 \end{cases}$ graphically.

A. The approximate solution is (– 1.3 , – 0.8).
B. The exact solution is (– 1.3 , – 0.8).
C. The exact solution is (– 1.5 , – 1).
D. The approximate solution is (– 1.5 , – 1).

9. Edmond worked *h* hours in May and the hourly wage was $40. His expenditure was $4 500 and he saved at least $1 500 in that month. Which of the following inequalities can be used to find the range of values of *h*?

    A. $40h + 4500 \leq 1500$
    B. $40h - 4500 \leq 1500$
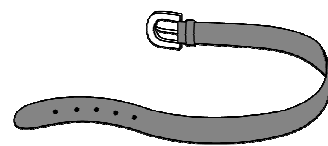   C. $40h + 4500 \geq 1500$
    D. $40h - 4500 \geq 1500$

10. Amy wants to measure the perimeter of a round flower bed. Which of the following methods measures the perimeter with the smallest error?
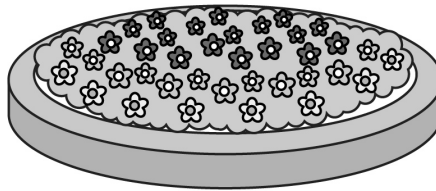
A. Use a ruler to measure the perimeter of the round flower bed
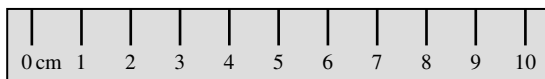
B. Measure the length of a leather belt and then use the belt to measure the perimeter of the round flower bed

C. Measure the length of her soles and then use the soles to measure the perimeter of the round flower bed

D. Use trundle wheel to measure the perimeter of the round flower bed

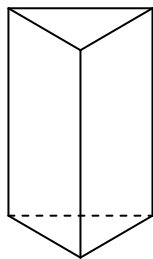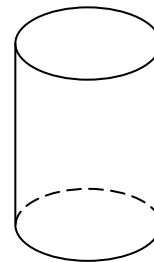11. Which of the following figures can represent a regular polyhedron?
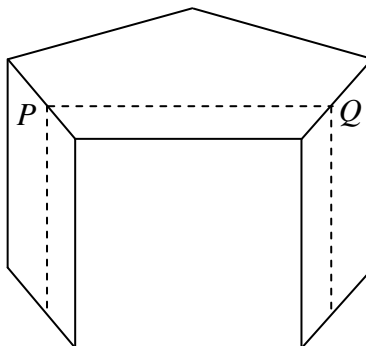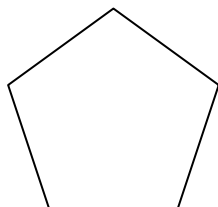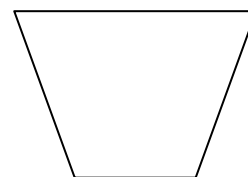
A.
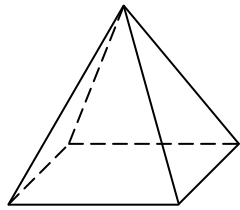
B.
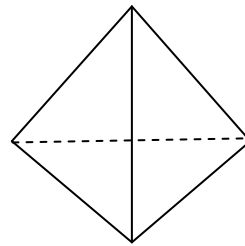
C.

D.

12. The figure shows a right prism.   Keith sketches a cross-section which is cut along the dotted line *PQ* and is perpendicular to the base.   Which of the following sketches is the plane diagram of the cross-section?
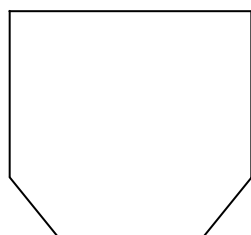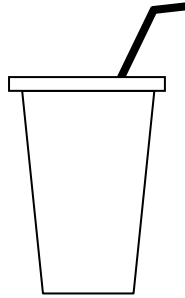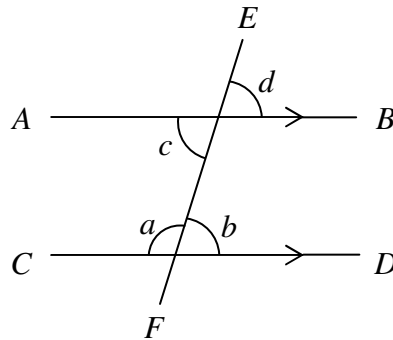

A.

B.

C.

D.

13.

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

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

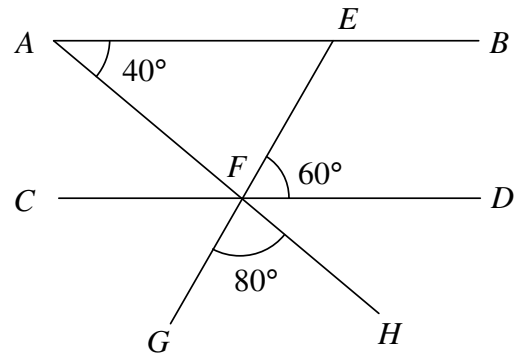14. In the figure, *AB // CD* and *EF* is a straight line.   Which of the following is a pair of corresponding angles?

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

15. In the figure, *AEB*, *CFD*, *AFH* and *EFG* are straight lines.
    $\angle BAH = 40°$, $\angle DFE = 60°$ and $\angle GFH = 80°$.
   Prove that *AB* // *CD*.

Which of the following proofs is **INCORRECT**?

A. $\angle AFE = 80°$ (vert. opp. ∠s)
    $\angle AFD = \angle AFE + \angle DFE$
    $\qquad = 140°$
    $\angle EAF + \angle AFD$
    $= 40° + 140°$
    $= 180°$
    $\therefore AB \text{ // } CD$ (int. ∠s supp.)

B. $\angle AFC = 40°$ (alt. ∠s, *AB* // *CD*)
    $\angle AFE + 40° + 60° = 180°$ (adj. ∠s on a st. line)
    $\angle AFE = 80°$
    $\angle AEF + 40° + 80° = 180°$ (∠ sum of △)
    $\angle AEF = 60°$
    $\angle AEF = \angle DFE$
    $\therefore AB \text{ // } CD$ (alt. ∠s equal)

C. $\angle DFH + 60° + 80° = 180°$ (adj. ∠s on a st. line)
    $\angle DFH = 40°$
    $\angle DFH = \angle EAF$
    $\therefore AB \text{ // } CD$ (corr. ∠s equal)

D. $\angle AFE = 80°$ (vert. opp. ∠s)
    $\angle AEF + 40° + 80° = 180°$ (∠ sum of △)
    $\angle AEF = 60°$
    $\angle AEF = \angle DFE$
    $\therefore AB \text{ // } CD$ (alt. ∠s equal)

16. In the figure, which point can be represented by $(-3, 4)$?
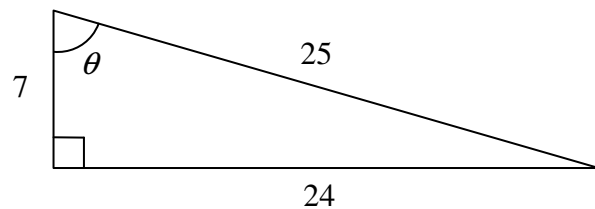
    A. E
    B. F
    C. G
    D. H
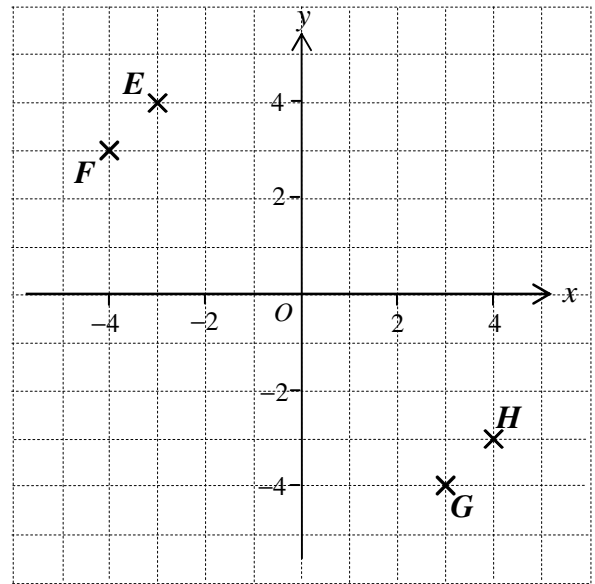
17. $A(7, 5)$ and $B(3, 9)$ are two points in a rectangular coordinate plane. The mid-point of AB is

    A. $(4, -4)$.
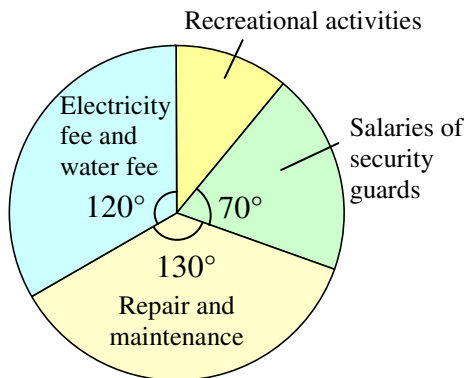   B. $(2, -2)$.
    C. $(10, 14)$.
    D. $(5, 7)$.

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

    A. $\dfrac{24}{25}$

    B. $\dfrac{7}{24}$

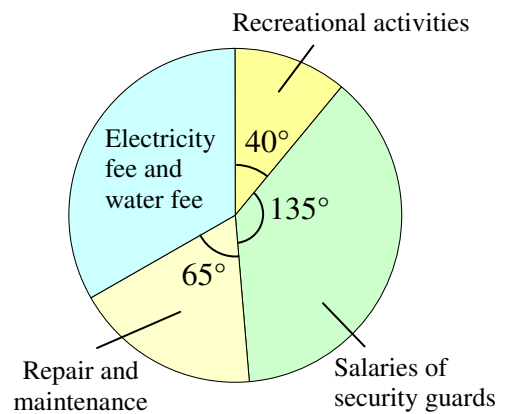   C. $\dfrac{7}{25}$

    D. $\dfrac{25}{7}$

19. The following two pie charts show the expenditure of Buildings *P* and *Q* in 2012 respectively.

Expenditure of Building *P* in 2012

Expenditure of Building *Q* in 2012

Which of the following descriptions **MUST** be correct?

A. The expenditure on electricity fee and water fee of each building is $\frac{1}{3}$ of its total expenditure.

B. The expenditure on recreational activities of Buildings *P* and *Q* are the same.
C. The expenditure on salaries of security guards of Building *P* is less than that of Building *Q*.
D. The expenditure on repair and maintenance of Building *P* is two times as much as that of Building *Q*.

20. The diagram below shows the number of mobile phones sold by the Clear Voice Company from 2008 to 2011.

Number of mobile phones sold by the Clear Voice Company
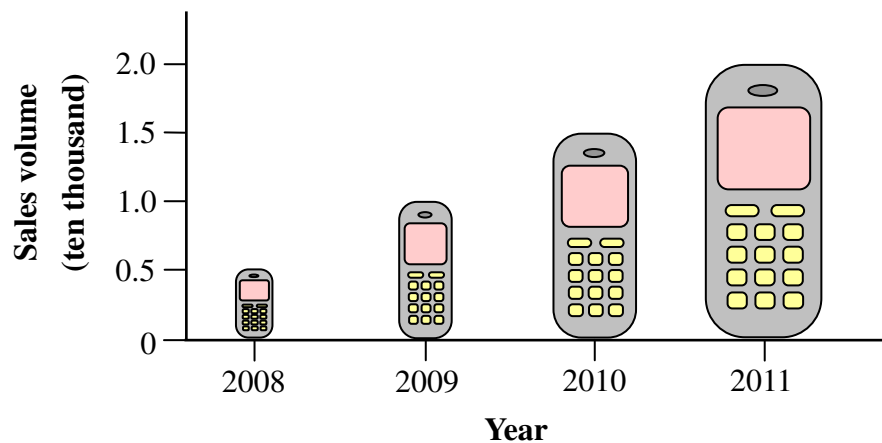
Based on the diagram above, Mr Chan concludes that the sales volume of the Clear Voice Company in 2011 is 10 times the sales volume in 2008.

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

A. The number of mobile phones sold in other years is not shown.
B. The scales on the vertical axis are not expressed in integers.
C. The areas of the figures in the diagram are not proportional to the sales volumes.
D. The number of mobile phones sold by other companies is not compared.

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

21. Round off 129.860 7 to 3 significant figures.

22. There are 60 students in a class. 23 of them are girls and the rest are boys. Find the ratio of the number of girls to the number of boys.

23. Tea is sold at the price rate of $1.8/g. How much should be paid when buying 600g of tea?

24. Consider the sequence of triangular numbers.

$$1 , 3 , 6 , 10 , 15 , x , \ldots$$

Find the value of x .

25. The nth term of a sequence is $\dfrac{n+6}{n+3}$. Find the value of the 7th term of the sequence.

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

27. Factorize $x^2 + 10x + 25$.

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

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

30. Make x the subject of the formula $y = \dfrac{x+1}{3}$.
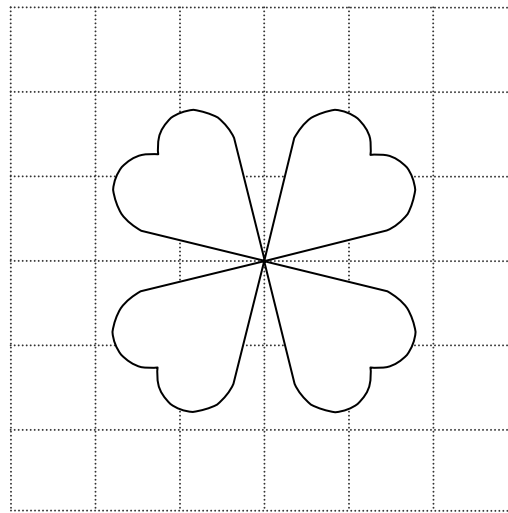
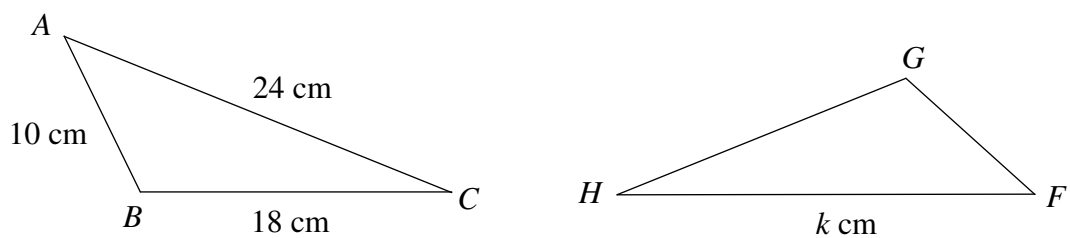31. According to the diagram, write down an inequality in *x*.
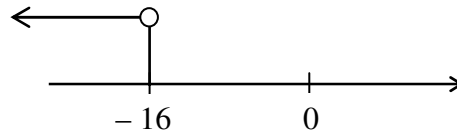
32. Use suitable notation and given letters to represent the angle marked in the figure.
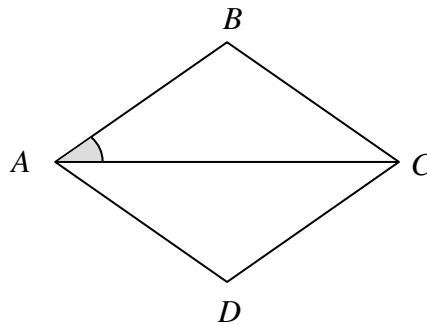
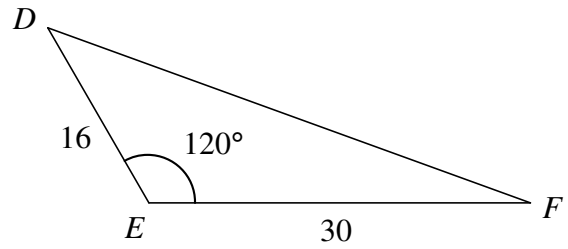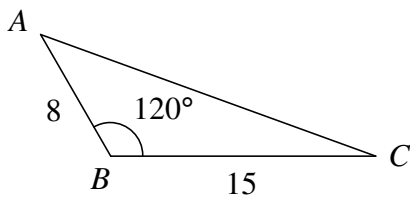33. Draw **ALL** axes of symmetry of the following figure in the **ANSWER BOOKLET**.

34.

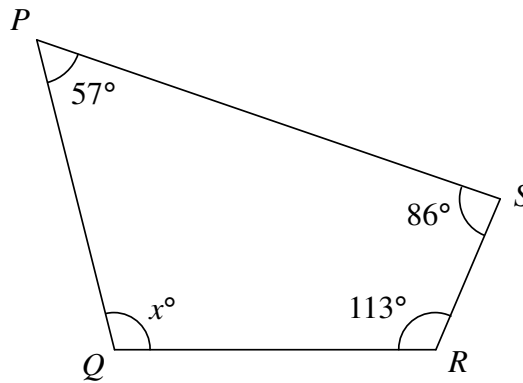In the figure, $\triangle ABC \cong \triangle FGH$. Find the value of *k*.

35.
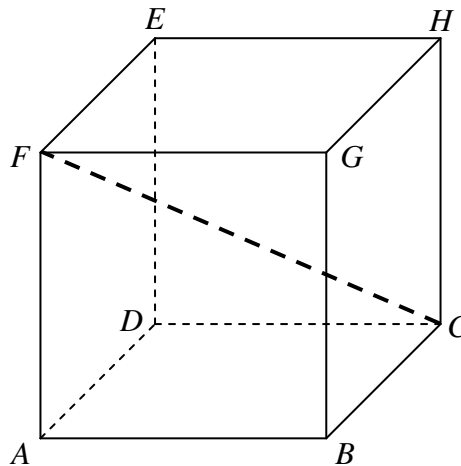

According to the given information in the above figure,

(a) identify whether △ABC and △DEF are congruent or similar triangles, and
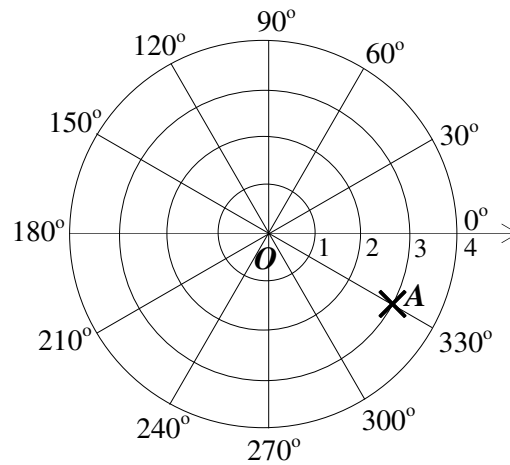
(b) choose the correct reason.

36. The figure shows a quadrilateral *PQRS*. Find the value of *x*.

37. In the figure, *ABCDEFGH* is a cube. *CF* is a diagonal of the cube. Name the angle between *CF* and the horizontal plane *ABCD*.

38. Find the polar coordinates of point A in the figure.

39. $A(8 , 6)$ and $B(12 , 18)$ are two points on straight line L in a rectangular coordinate plane.　Find the slope of L.

40. Patrick is doing a survey to analyse online shopping modes of local university students.　The survey is conducted in the following four stages.

   (1)　Organise the data of various online shopping modes collected from the questionnaires.
   (2)　Give questionnaires about online shopping modes to local university students.
   (3)　Analyse graphs and data to draw conclusions.
   (4)　Use suitable graphs to represent the data of various online shopping modes.

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

41. The table below shows the marks that Andy got in different sub-papers of an English examination and the weight of each sub-paper.

	Sub-paper			
	Reading	Writing	Speaking	Listening
Mark	94	70	68	82
Weight	30%	35%	20%	15%

Find the weighted mean mark of Andy.

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. A letter is randomly chosen from each of the two words 'TO' and 'SEND' respectively.
     (a) List out all possible outcomes in the table provided in the **ANSWER BOOKLET**.
     (b) Find the probability that the two letters chosen are 'T' and 'S'.

43. Cherry deposits $6 800 in a bank.   The simple interest rate is 3% p.a.   Find the interest she will
     receive after 4 years.

44. In an experiment, the number of bacteria increases steadily at a rate of 50% per hour.   If there are
     2 160 bacteria now, find the number of bacteria three hours ago.

45. The figure shows a solid triangular prism.   Its base is a right-angled triangle.   Find the total
   surface area of the prism.
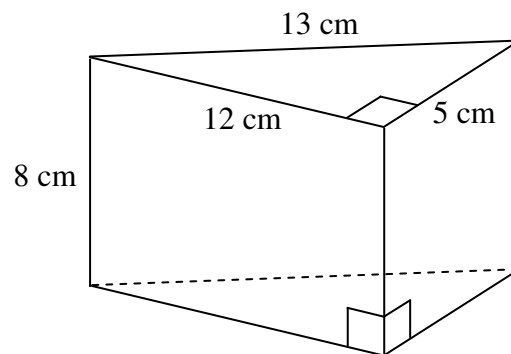
46. (a) Simplify $x^2 \cdot x^5$ and express the answer with positive index.

     (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. In the figure, BCD is a straight line. $AB = AD$, $\angle BAC = 75°$ and $\angle ADC = 40°$. Find x.
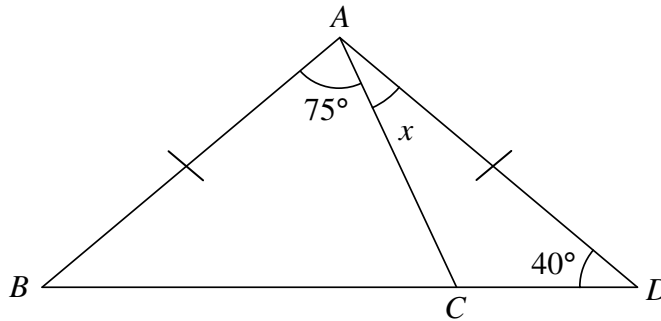
49. In the figure, a fishing boat sails 16 km from pier A to B and the compass bearing of B from A is N50°E. The boat then turns 90° to its right and sails to pier C. It is known that the distance between A and C is 18 km.

(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)
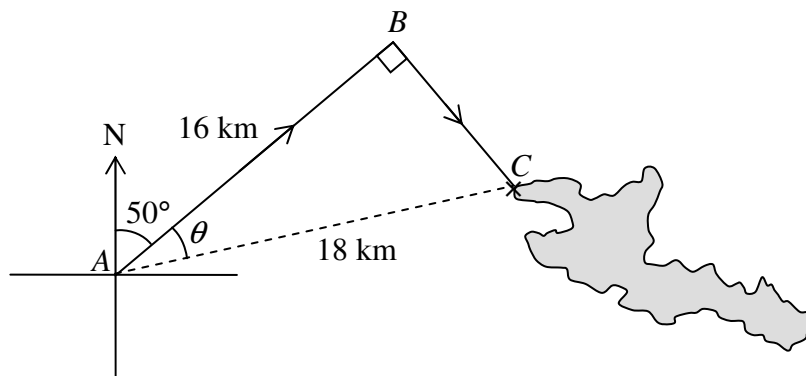
50. There are 8 photo frames in a shop. Their prices are listed below:
   $20, $82, $85, $25, $89, $100, $93, $110

   The shopkeeper said, 'Since the arithmetic mean of the prices of the photo frames is $75.5, most of the prices of the photo frames are less than $80.'
   Do you agree with the shopkeeper's claim? Explain your answer.

END OF PAPER