

<b>9</b>	<b>M</b>	<b>E</b>	<b>1</b>	<b>(</b>	<b>Q</b>	<b>)</b>
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**Education Bureau**  
**Territory-wide System Assessment 2011**  
**Secondary 3**  
**Mathematics**  
**QUESTION BOOKLET**

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**INSTRUCTIONS**

1. There are 52 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	$= 2\pi r h$
	Volume	$= \pi r^2 h$
Cone	Curved surface area	$= \pi r l$
	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. Calculate  $3 - 3(-2)$ .  
  
A. 9  
B. 2  
C.  $-2$   
D. 0
  
2. Round off 1.093 93 to 3 decimal places.  
  
A. 1.09  
B. 1.093  
C. 1.093 9  
D. 1.094
  
3. Of the students at Kai Shing Secondary School, there are 500 boys. The number of girls is greater than number of boys by 200.  
Find the ratio of number of girls to total number of students in that school.  
  
A. 7 : 12  
B. 5 : 12  
C. 2 : 7  
D. 2 : 5
  
4. Find the degree of the polynomial  $7x^3y^2 + x^2y + 8x - 12$ .  
  
A. 3  
B. 4  
C. 5  
D. 6

5. Simplify  $(3x + 2y) - (3y - 2x)$ .

- A.  $5x - y$
- B.  $x - y$
- C.  $4xy$
- D.  $0$

6.  $2a^4 \times 4a^2 =$

- A.  $6a^6$ .
- B.  $6a^8$ .
- C.  $8a^6$ .
- D.  $8a^8$ .

7. There are  $x$  pieces of \$50 notes and  $y$  pieces of \$100 notes only with a total amount of \$700 in the cash box. If there is a total of 11 notes, which of the following pairs of simultaneous equations shows the relations between  $x$  and  $y$  ?

- A. 
$$\begin{cases} y = 11 + x \\ 50x + 100y = 700 \end{cases}$$
- B. 
$$\begin{cases} x + y = 11 \\ 50x + 100y = 700 \end{cases}$$
- C. 
$$\begin{cases} x + y = 11 \\ 100x + 50y = 700 \end{cases}$$
- D. 
$$\begin{cases} x = 11 + y \\ 100x + 50y = 700 \end{cases}$$

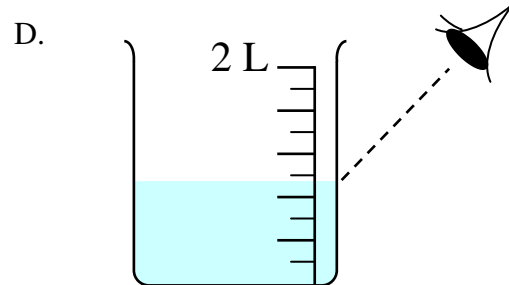
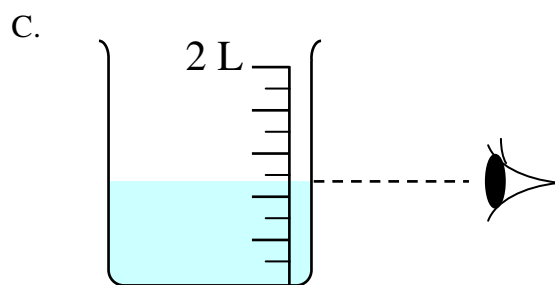
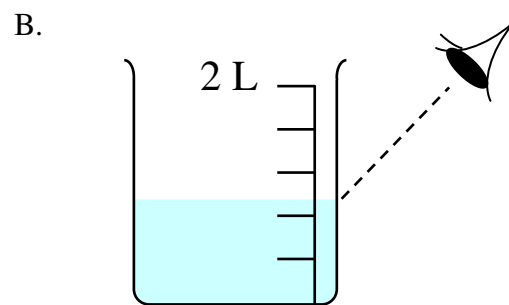
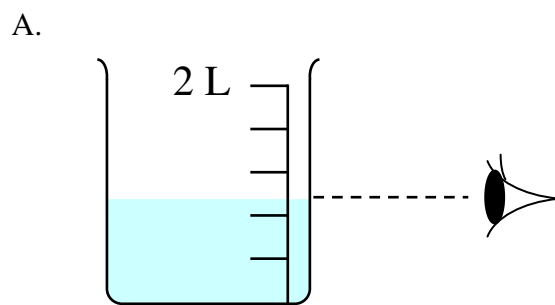
8. Which of the following is an identity?

- A.  $x^2 - 4 = (x - 2)^2$
- B.  $x^2 - 4 = 0$
- C.  $5(x^2 - 4) = 5x^2 - 4$
- D.  $(2 + x)(x - 2) = x^2 - 4$

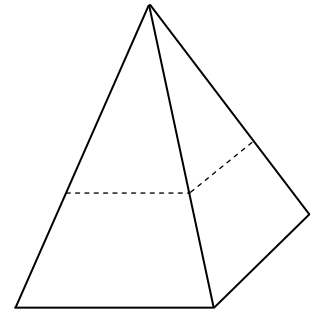
9. The capacity of a box of milk is 235 mL (correct to the nearest mL). Which of the following is the possible range of the actual capacity of that box of milk?

	<u>Lower limit</u>	<u>Upper limit</u>
A.	230 mL	240 mL
B.	234 mL	236 mL
C.	232.5 mL	237.5 mL
D.	234.5 mL	235.5 mL

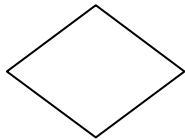
10. Fanny wants to measure the volume of a liquid. Among the following methods, which one can give a more accurate reading of volume?



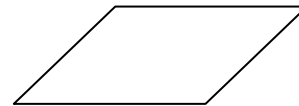
11. The figure shows a right pyramid with square base.  
 Ronald sketches its cross-section parallel to the base.  
 Which of the following sketches is the plane diagram of the cross-section?



A.



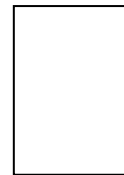
B.



C.

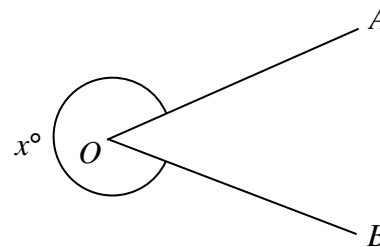


D.



12. In the figure,  $AO$  and  $BO$  are straight lines.  $x^\circ$  is

- A. a straight angle.  
 B. a reflex angle.  
 C. an acute angle.  
 D. an obtuse angle.



13. Figure  $P$  is changed to Figure  $Q$  after a single transformation. The transformation is

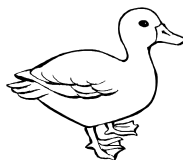


Figure  $P$

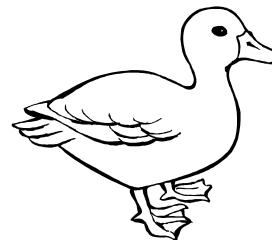
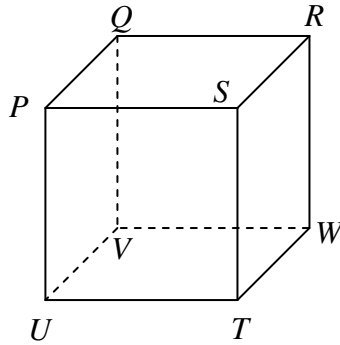


Figure  $Q$

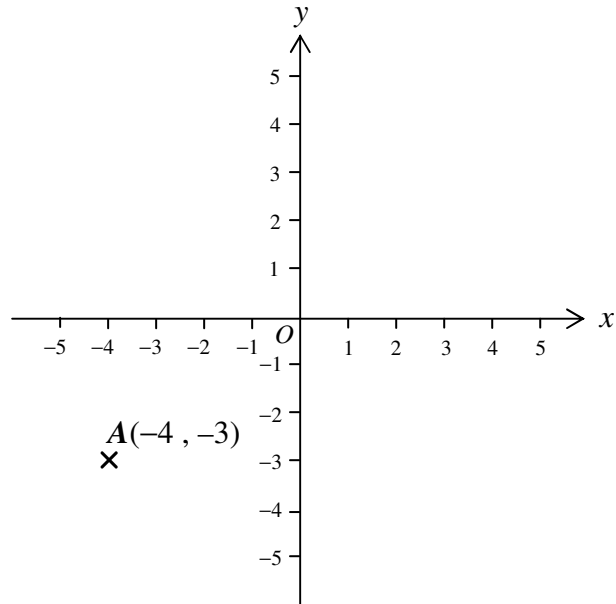
- A. rotation.  
 B. enlargement.  
 C. translation.  
 D. reflection.

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

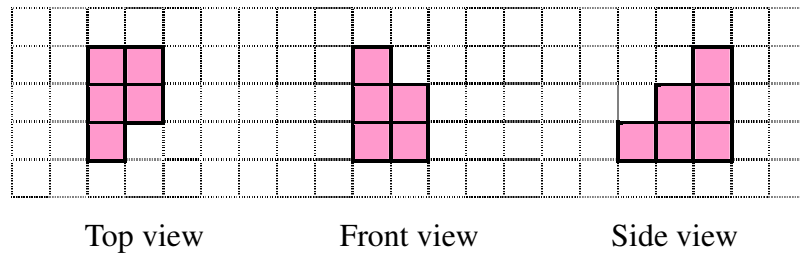


- A.  $PQVU$   
 B.  $PQRS$   
 C.  $PSTU$   
 D.  $PRWU$
15. In the figure, point  $A(-4, -3)$  is rotated about the origin  $O$  through  $90^\circ$  in clockwise direction to the point  $A'$ , the coordinates of  $A'$  are

- A.  $(-3, 4)$ .  
 B.  $(-4, 3)$ .  
 C.  $(3, -4)$ .  
 D.  $(4, -3)$ .

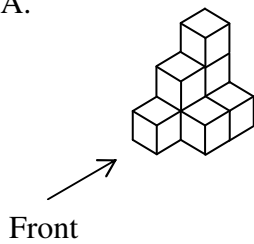


16. The figures below show the 2-D representations of a solid from various views:

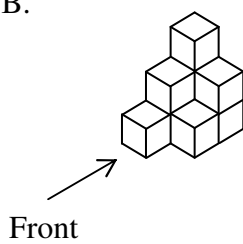


Which of the following could be the solid?

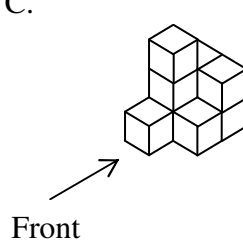
A.



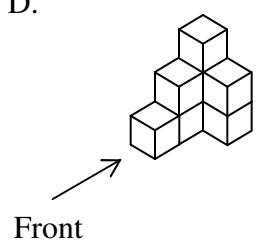
B.



C.

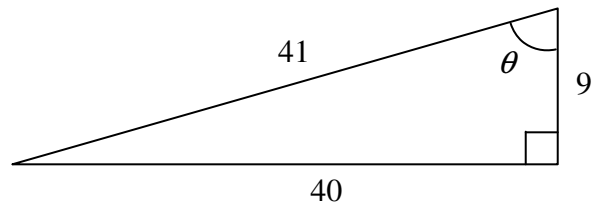


D.



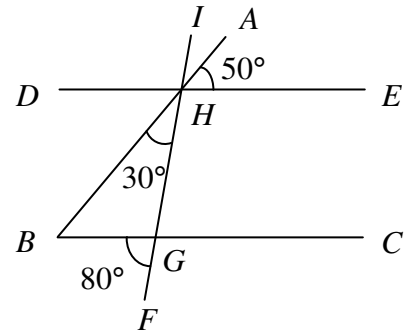
17. Find the value of  $\tan \theta$  in the figure.

- A.  $\frac{40}{9}$
- B.  $\frac{9}{41}$
- C.  $\frac{9}{40}$
- D.  $\frac{40}{41}$





18. In the figure,  $AHB$ ,  $BGC$ ,  $DHE$  and  $FGHI$  are straight lines,  
 $\angle AHE = 50^\circ$ ,  $\angle BHG = 30^\circ$  and  $\angle BGF = 80^\circ$ .  
 Prove that  $BC \parallel DE$ .



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

- A.  $\angle DHB = 50^\circ$  (vert. opp.  $\angle$ s)  
 $\angle DHG = \angle DHB + \angle BHG$   
 $= 80^\circ$   
 $\angle BGF = \angle DHG$   
 $\therefore BC \parallel DE$  (corr.  $\angle$ s equal)
- B.  $\angle HBG + 30^\circ = 80^\circ$  (ext.  $\angle$  of  $\triangle$ )  
 $\angle HBG = 50^\circ$   
 $\angle AHE = \angle HBG$   
 $\therefore BC \parallel DE$  (corr.  $\angle$ s equal)
- C.  $\angle HGC = 80^\circ$  (vert. opp.  $\angle$ s)  
 $\angle DHB = 50^\circ$  (vert. opp.  $\angle$ s)  
 $\angle DHG = \angle DHB + \angle BHG$   
 $= 80^\circ$   
 $\angle HGC = \angle DHG$   
 $\therefore BC \parallel DE$  (alt.  $\angle$ s equal)
- D.  $\angle ABC = 50^\circ$  (corr.  $\angle$ s,  $BC \parallel DE$ )  
 $\angle DHB = 50^\circ$  (alt.  $\angle$ s,  $BC \parallel DE$ )  
 $\angle DHG = \angle DHB + \angle BHG$   
 $= 80^\circ$   
 $\angle BGF = \angle DHG$   
 $\therefore BC \parallel DE$  (corr.  $\angle$ s equal)

19. A librarian constructed a stem-and-leaf diagram to show the numbers of books borrowed by 20 students in the first term.

Numbers of books borrowed by 20 students in the first term

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

How many students borrowed more than 35 books?

- A. 7
  - B. 8
  - C. 9
  - D. 10
20. A research centre recorded the annual average air temperatures at the South Pole over the last 10 years. The centre wants to study the trend of the annual average air temperatures in these 10 years using a statistical graph. Which of the following graphs is the most suitable?
- A. Frequency polygon
  - B. Histogram
  - C. Broken line graph
  - D. Stem-and-leaf diagram

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

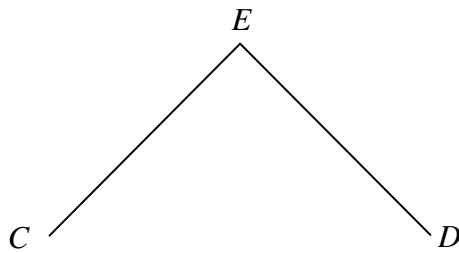
21. +100 represents moving 100 m to the east. Use positive numbers, negative numbers or zero to represent the following situations:
- (i) Moving 200 m to the east
  - (ii) Moving 50 m to the west
22. In the following situations, are the values mentioned exact or estimated?
- (i) There are 200 000 trees in Hong Kong now.
  - (ii) A tree expert examined 13 trees yesterday.
23. Round off 17.863 5 to 3 significant figures.
24. In a bag, the numbers of black marbles, red marbles and yellow marbles are in the ratio 5 : 3 : 7. If there are 15 black marbles in the bag, find the sum of the number of red marbles and yellow marbles.
25. Expand  $(2y - 3)(y - 1)$ .
26. Factorize  $2x - 2y + kx - ky$ .
27. Factorize  $x^2 + 3x - 4$ .
28. Solve  $7 - 4x = 2x - 11$ .
29. Expand  $(4 + x)(4 - x)$ .
30. Simplify  $\frac{3}{2a} - \frac{3}{4a}$ .

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

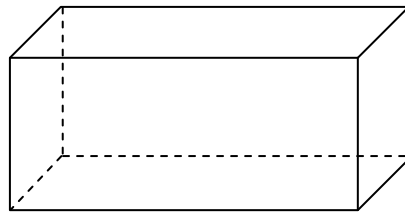
i.  $\sqrt{2}$    $\sqrt{3}$

ii.  $\frac{1}{\sqrt{3}}$    $\frac{1}{\sqrt{2}}$

32. Use suitable notations and given letters to represent one of the line segments shown in the figure.

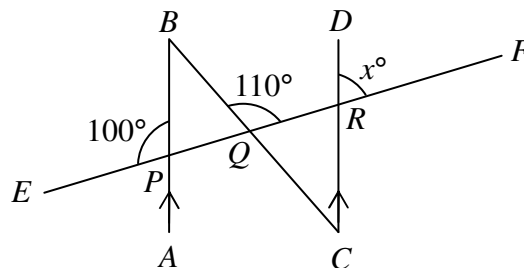


33. The figure shows the diagram of a cuboid:

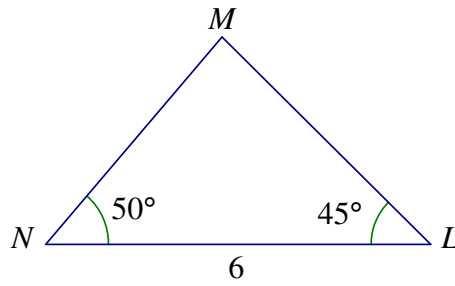


Referring to the sketch shown above, draw a diagram of a **pyramid with triangular base** in the space provided in the **ANSWER BOOKLET**. (Use solid lines and dotted lines to show all edges)

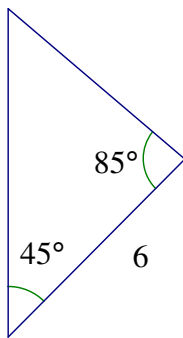
34. In the figure,  $APB$ ,  $BQC$ ,  $CRD$  and  $EPQRF$  are straight lines,  $AB \parallel CD$ ,  $\angle BPE = 100^\circ$  and  $\angle BQR = 110^\circ$ . Find the value of  $x$ .



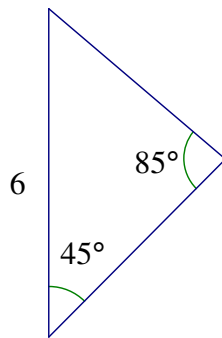
35.



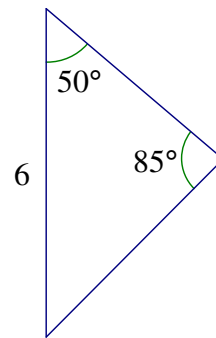
Which of the following triangles **MUST** be congruent to the  $\triangle LMN$  as shown in the above figure? (May be more than one answer)



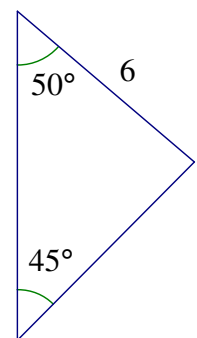
Triangle A



Triangle B

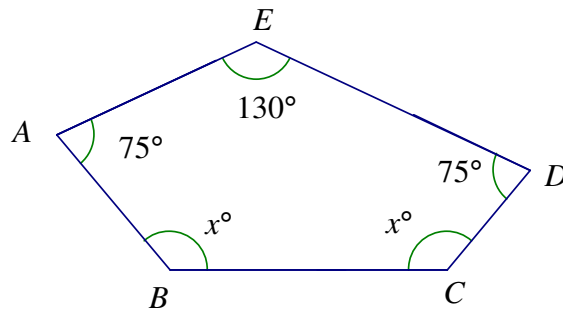


Triangle C

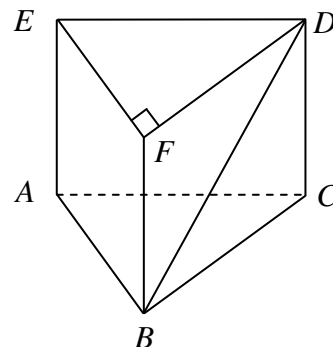


Triangle D

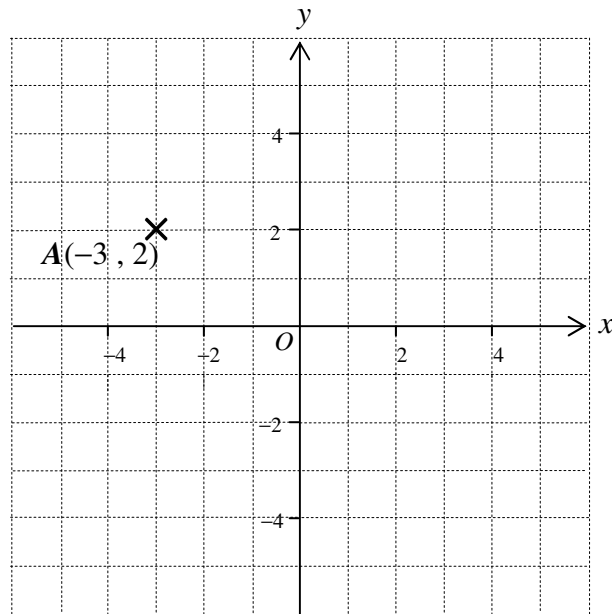
36. The figure shows a pentagon  $ABCDE$ . Find the value of  $x$ .



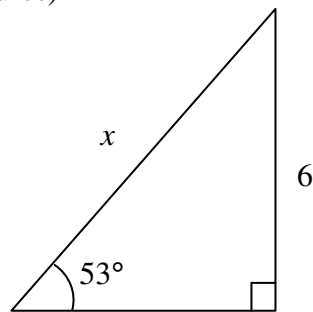
37. The figure shows a right prism  $ABCDEF$ . Its base  $ABC$  is a right-angled triangle and a horizontal plane. Name the angle between line  $BD$  and plane  $ABFE$ .



38. Point  $A(-3, 2)$  is translated 5 units downwards to point  $A'$ . Find the coordinates of  $A'$ .



39.  $A(3, -1)$  and  $B(-3, 5)$  are two points in the rectangular coordinate plane. Find the coordinates of the mid-point of line segment  $AB$ .
40. Find the value of  $x$ . (Correct to 3 significant figures)



41. The inflation rates (%) of a city in 8 consecutive years are as follows:

6, 3, 2, 1, 1, 3, 6, 6

Find the arithmetic mean and median of the above data.

42. David took part in an interview for a job. The following table shows the marking criteria in the interview and the marks that David got.

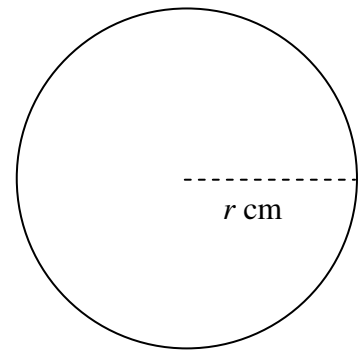
Marking items				
	Working Experiences	Related Qualifications	Language Proficiency	Analytic Skill
Weight	3	2	3	2
Marks	19	16	18	11

Find the weighted mean mark that David got.

43. In the 2010 World Cup Finals, Paul the Octopus predicted the winners of 8 of the football matches. Lastly, the 8 winners were predicted correctly. Find the empirical probability that Paul predicted correctly.

**SECTION C:** All working must be clearly shown.  
Write the mathematical expressions, answers and statements/conclusions in the spaces provided in the ANSWER BOOKLET.

44. The marked price of a TV set is \$12 000. If it is sold at a discount of 15%, find the discount.
45. The annual car sales of WIND Motor were 45 000 vehicles in 2010. If the annual car sales are expected to increase by 10% each year, find the expected annual car sales of WIND Motor in 2013.
46. The circumference of a circle is  $28\pi$  cm.  
 (a) Let the radius of the circle be  $r$  cm. Find the value of  $r$ .  
 (b) Find the area of the circle. Express the answer in terms of  $\pi$ .



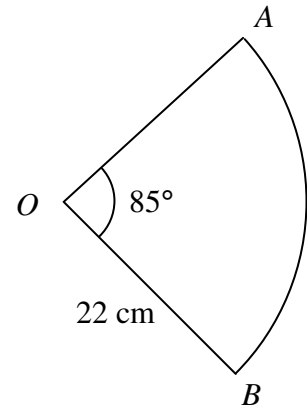
47. Complete the table for the equation  $y - 3 = 0$  in the **ANSWER BOOKLET**.

$x$	$-2$	$0$	$2$
$y$		$3$	

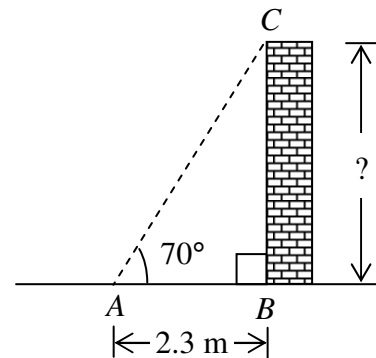
According to the table, draw the graph of this equation on the rectangular coordinate plane given in the **ANSWER BOOKLET**.



48. In the figure, the radius of the sector  $OAB$  is 22 cm and  $\angle AOB = 85^\circ$ . Find the length of  $\widehat{AB}$ . Correct the answer to 3 significant figures.



49. In the figure, the length of  $AB$  is 2.3 m. The angle of elevation of point  $C$  from point  $A$  is  $70^\circ$ . Find the height of the wall  $BC$ . Correct the answer to the nearest 0.1 m.

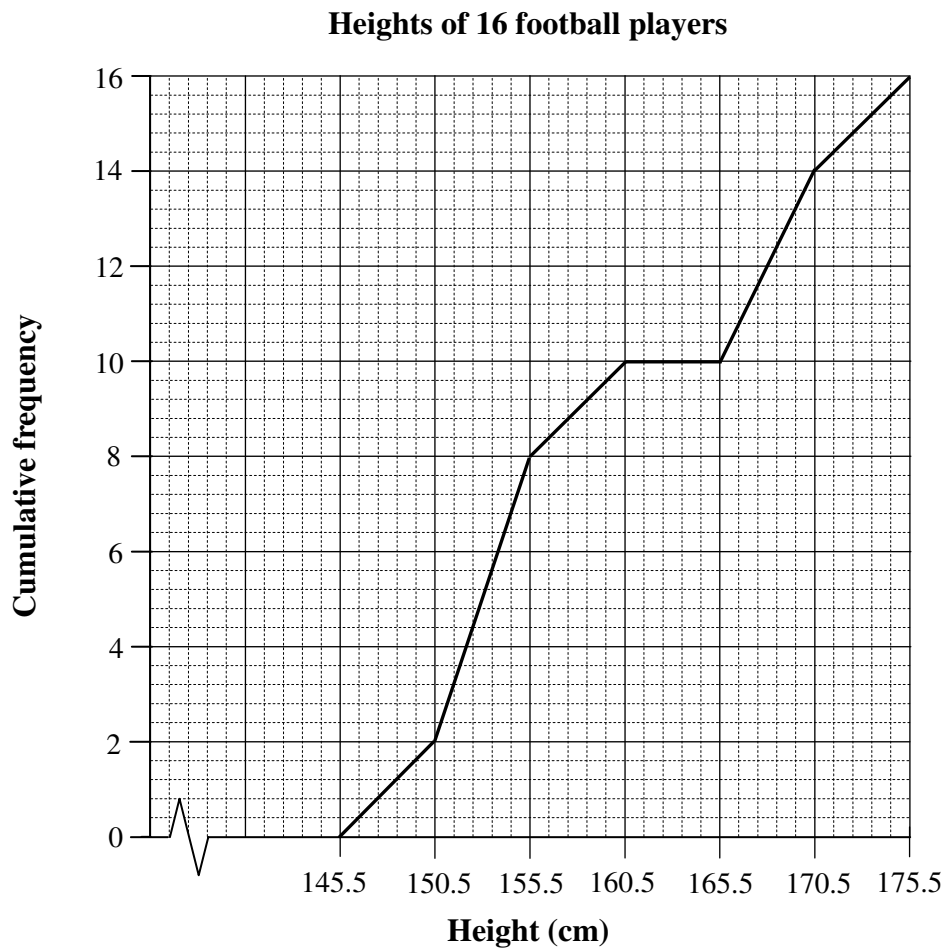


50. The table below shows the test marks of 8 students in Mathematics and Science.

Student	Mathematics (marks)	Science (marks)
A	2	2
B	5	4
C	8	6
D	10	10
E	12	11
F	14	16
G	15	18
H	18	18

- (a) The marks of Student A to Student F are indicated on the scatter diagram in the **ANSWER BOOKLET**. Complete the diagram with the marks of Student G and Student H.
- (b) According to the completed diagram, what is the relationship between their marks in the two subjects?

51. The following cumulative frequency polygon shows the heights of 16 football players.



- How many players are shorter than 160.5 cm?
- How many players whose heights are between 150.5 cm and 155.5 cm?
- The first class interval is 146 cm — 150 cm. If only 3 players are taller than James, which class interval should James' height belong to?

52. A copper pipe is 20 m long. Estimate the maximum number of segments of length 4.22 m that can be cut from the copper pipe. Briefly explain your estimation method.  
(According to the situation, get a suitable approximation for the underlined value.)

END OF PAPER



