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Education Bureau
Territory-wide System Assessment 2009
Secondary 3
Mathematics
QUESTION BOOKLET

INSTRUCTIONS

1. There are 48 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. Rough work should be done on the rough work sheet provided.
6. 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	$= \frac{1}{3} \times \text{base area} \times \text{height}$

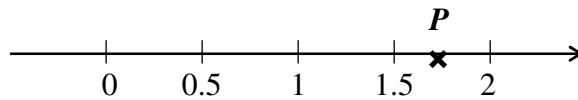
SECTION A: Choose the best answer for each question.

You should mark all your answers in the ANSWER BOOKLET.

1. Which of the following integers is closest to $\sqrt{170}$?

- A. 13
- B. 14
- C. 40
- D. 85

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



- A. 1.5
- B. $\sqrt{2}$
- C. $\sqrt{3}$
- D. 2

3. $4 + 2x =$

- A. $4 + 2 + x$.
- B. $4 + x + x$.
- C. $2 + 4x$.
- D. $6x$.

4. The base fee of Helen's mobile phone plan is \$20. It includes 500 minutes free airtime. The fee thereafter is \$0.1 per minute.

Helen used her mobile phone for more than 500 minutes this month. If she used the phone for x minutes, which of the following equations can be used to find Helen's mobile phone fees \$ C this month?

- A. $C = 20 + (0.1)x$
- B. $C = 20 + (0.1)x - 500$
- C. $C = 20 + (500 - x)(0.1)$
- D. $C = 20 + (x - 500)(0.1)$

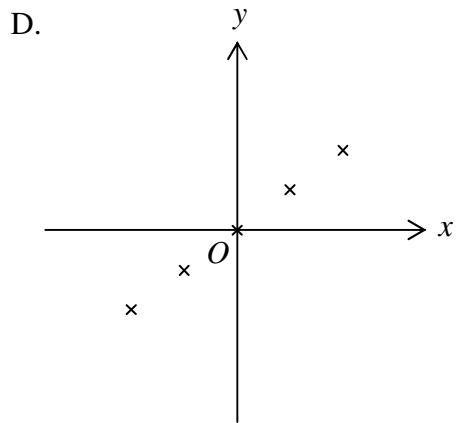
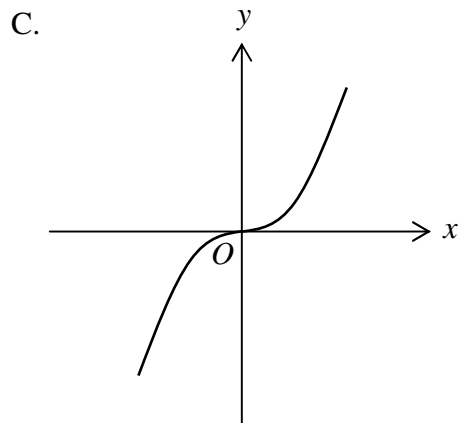
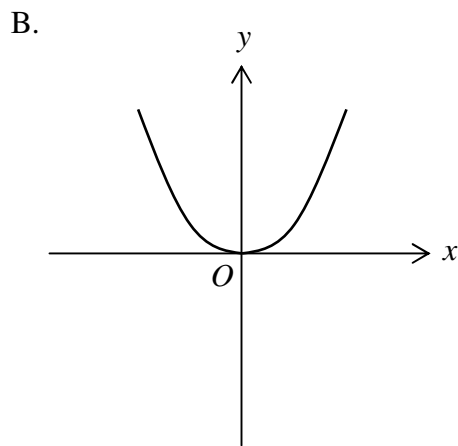
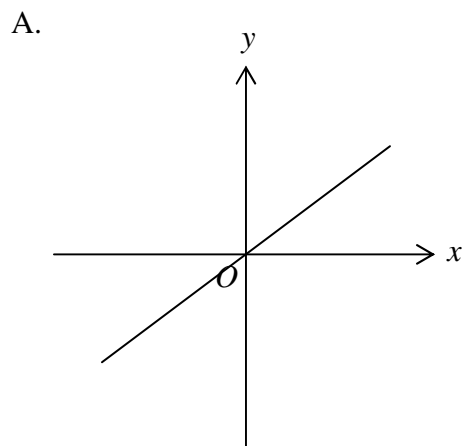
5. Which of the following polynomials is in descending powers of x ?

- A. $4 - 2x + 3x^2 - x^3$
- B. $4 + 3x^2 + 2x - x^3$
- C. $-x^3 + 3x^2 + 2x + 4$
- D. $-x^3 + 2x + 3x^2 + 4$

6. $(-2)^{-3} =$

- A. 8 .
- B. $\frac{1}{8}$.
- C. -8 .
- D. $-\frac{1}{8}$.

7. Which of the following may represent the graph of the equation $2x - 3y = 0$?



8. $\frac{x}{3} + \frac{3}{x} =$

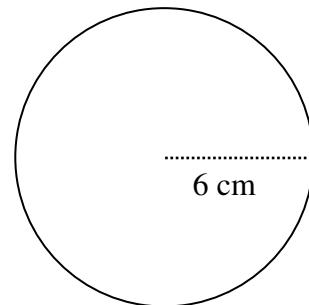
- A. 1 .
- B. $\frac{x+3}{3x}$.
- C. $\frac{x^2+9}{3x}$.
- D. $\frac{x^2+9}{x+3}$.

9. The area of Hong Kong Island is 78 km² (correct to the nearest km²). What is the range of the actual area of Hong Kong Island?

- A. 77 km² to 79 km²
- B. 77.5 km² to 78.5 km²
- C. 75 km² to 85 km²
- D. 77.05 km² to 78.05 km²

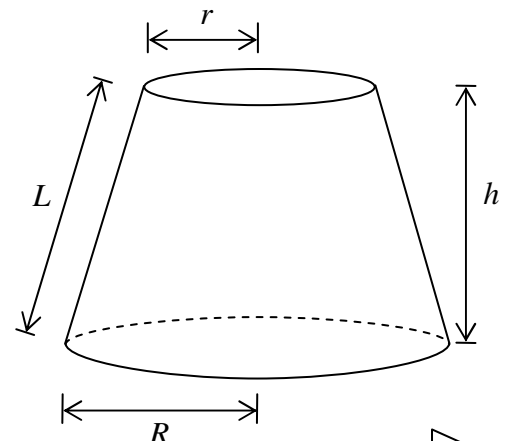
10. The radius of a circle is 6 cm. Find its area.

- A. 12 cm²
- B. 6π cm²
- C. 12π cm²
- D. 36π cm²



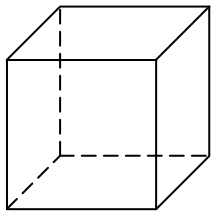
11. The frustum in the figure is formed by a right circular cone cutting off its top. Its top radius and base radius are r and R respectively. Its height is h , and lateral height is L . Considering the dimensions, determine which of the following could be the formula of lateral surface area of the frustum.

- A. $\pi(R+r)$
- B. $\pi(R+r)L$
- C. $\frac{1}{3}\pi h(R^2+r^2+Rr)$
- D. $\pi(R+r+L+h)$

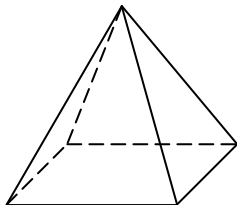


12. The following are diagrams of four 3-D figures. Which of these CANNOT be a regular polyhedron?

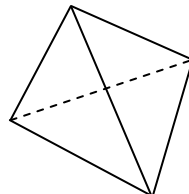
A.



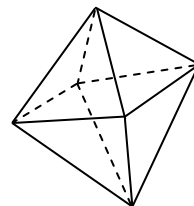
B.



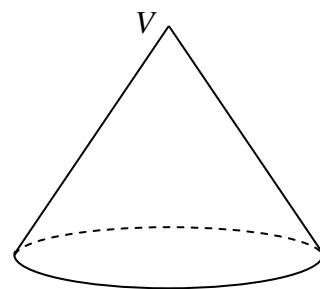
C.



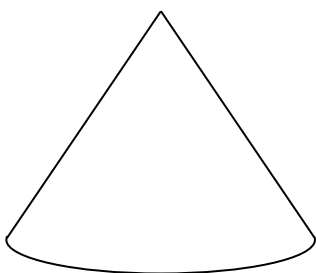
D.



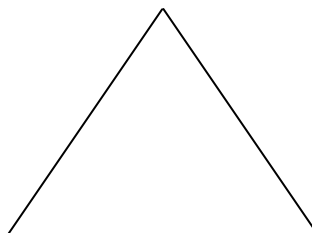
13. The figure shows a right circular cone. Ken needs to draw a cross-section which is perpendicular to the base and passing through vertex V . Which of the following is the plane diagram of the cross-section?



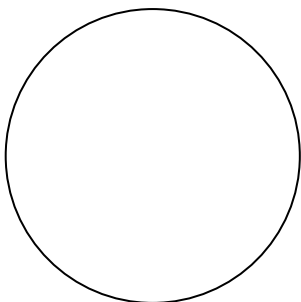
A.



B.



C.

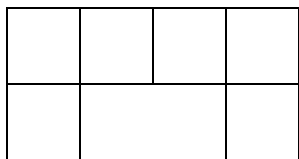


D.

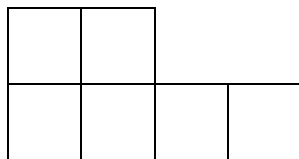


14. Which of the following nets can be folded into a cube?

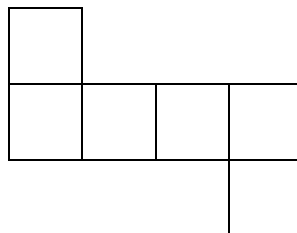
A.



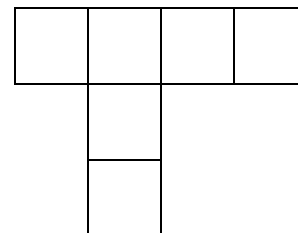
B.



C.



D.



15. Figure 1

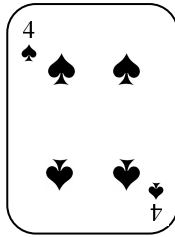


Figure 2

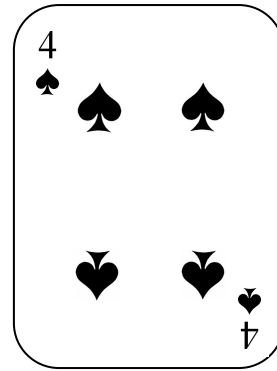


Figure 1 is changed to Figure 2 after a single transformation. The transformation is

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

16. Will the size and shape of the figure

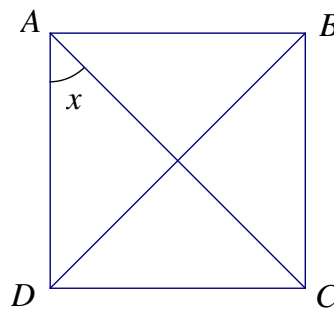


be changed after a single translation?

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

17. In the figure, $ABCD$ is a square. Find x .

- A. 30°
- B. 45°
- C. 60°
- D. 90°

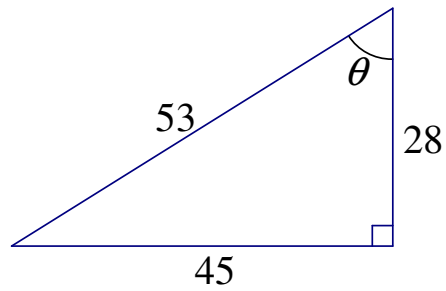


18. William needs to collect the data of air pollution indices of Sha Tin in the past year. Which of the following is the most suitable method?

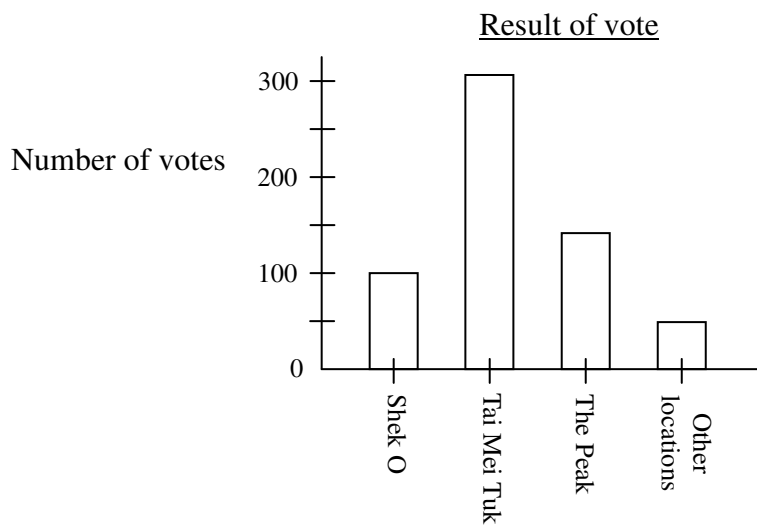
- A. Go to Sha Tin to observe the air pollution there.
- B. Send questionnaires to people living in Sha Tin.
- C. Search for information from the webpage of Environmental Protection Department.
- D. Interview people living in Sha Tin by phone.

19. Find the value of $\sin \theta$ in the figure.

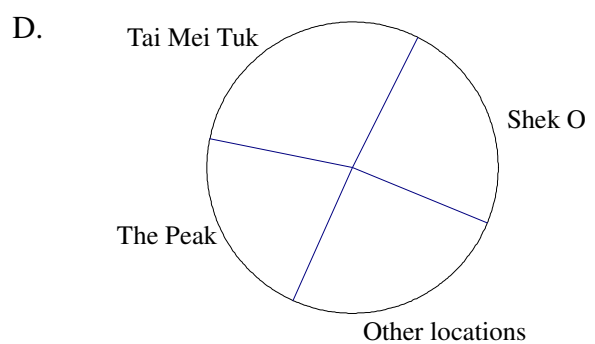
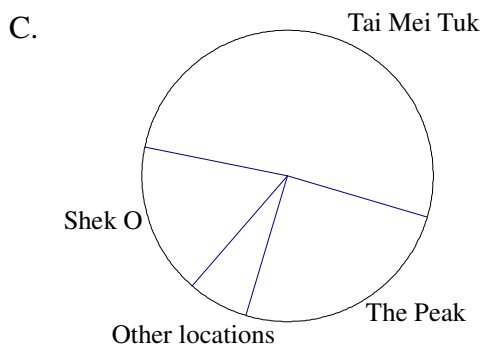
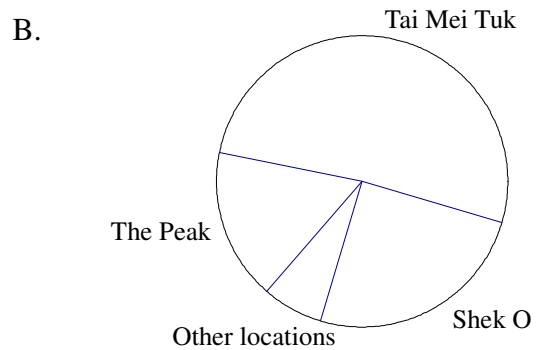
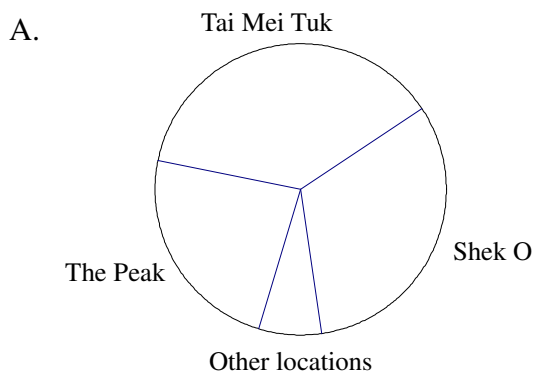
- A. $\frac{28}{53}$
- B. $\frac{45}{53}$
- C. $\frac{53}{45}$
- D. $\frac{45}{28}$



20. The student council held a vote on the location of school picnic. The result was as follows:



If the above data is presented by a pie chart, which of the following should be obtained?



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

21. (a) Calculate $(-2)(-3)$.

(b) Calculate $-2-3$.

22. Calculate $\frac{4+7(-6)}{-2}$.

23. The liftoff weight of Long March 3 Rocket is 24 000 kg. Use scientific notation to represent this weight.

24. It is given that $a : b : c = 4 : 6 : 9$. If $a = 2$, find the values of b and c .

25. Find the values of x and y in the following Fibonacci sequence:

1 , 1 , 2 , 3 , 5 , 8 , 13 , x , y , ...

26. Expand $x(3x^2 - 2x + 1)$.

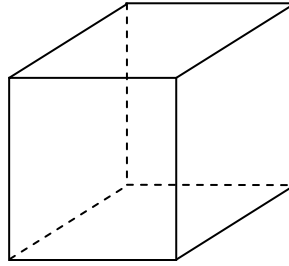
27. Factorize $4x^2 + 12x + 9$.

28. Solve $5x - 4 = 3(x + 2)$.

29. Expand $(x + 3)(x - 3)$.

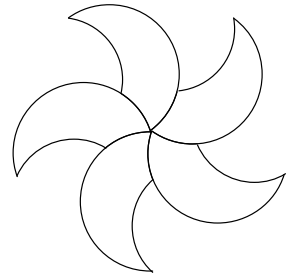
30. Solve the inequality $-3x + 2 < 11$.

31. The figure shows the diagram of a cube:

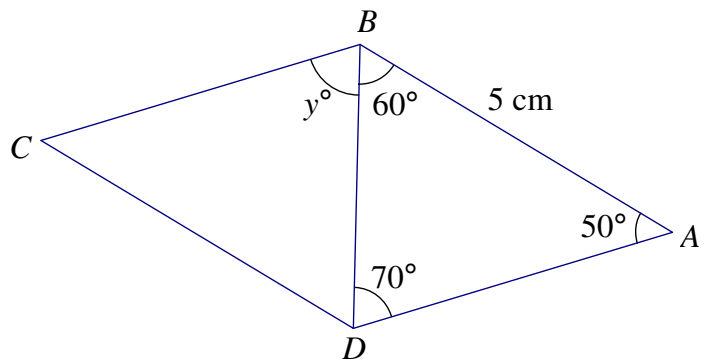


In the space provided in the **ANSWER BOOKLET**, draw a diagram of a triangular prism. (Use solid and dotted lines to show all edges.)

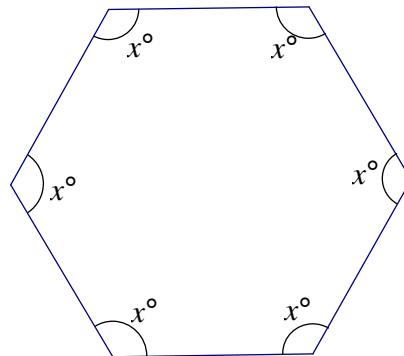
32. Find the order of rotational symmetry of the figure on the right.



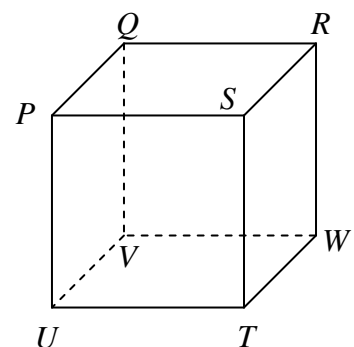
33. In the figure, $\triangle ABD \cong \triangle CDB$. Find the value of y .



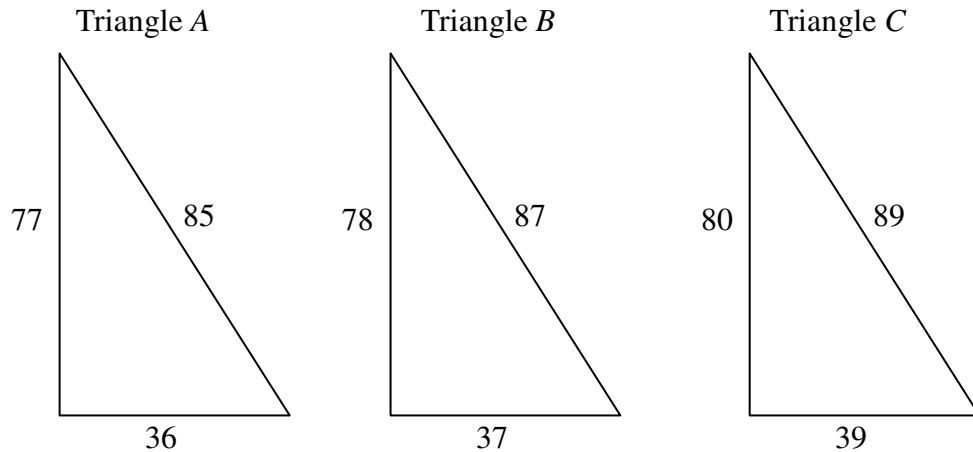
34. According to the figure, find the value of x .



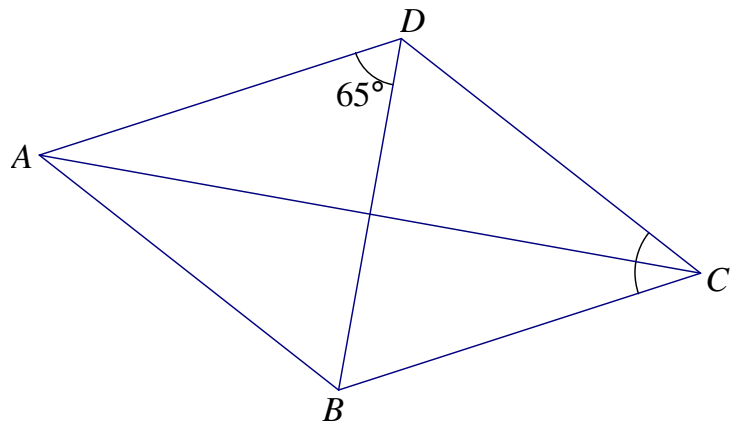
35. The figure shows a cube $PQRSTUW$. Using four of its vertices (i.e. P , Q , R , S , T , U , V or W), name **ONE** of the planes of reflectional symmetry of the cube.



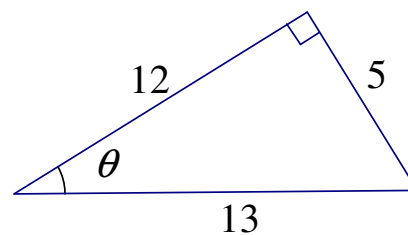
36. Which of the following must be right-angled triangle(s)? (There may be more than one answer.)



37. In the figure, $ABCD$ is a rhombus.
Find $\angle BCD$.



38. In the figure, find θ correct to the nearest 0.1° .



39. An investment fund is made up of three different stocks. The stocks of each unit of the investment fund are as follows:

	Stock A	Stock B	Stock C
Unit price of stock	\$2.8	\$4.0	\$16.4
weight	2	2	1

Find the weighted mean of unit prices of stocks.

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. The price of a music CD was \$110. Tim bought it from the Internet and got 5% discount. How much did Tim pay?

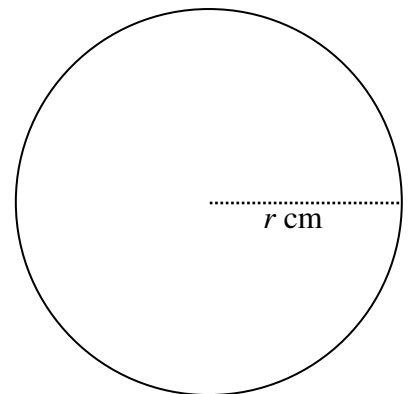
41. There are 2000 sheets of A4 paper in one stack. The area of each piece of A4 paper is 0.063 m^2 . The weight of A4 paper is 90 g per m^2 . Find the weight in g of one stack of A4 paper.

42. Simplify $\frac{x^5}{x^3y^{-4}}$ and express the answer with positive indices.

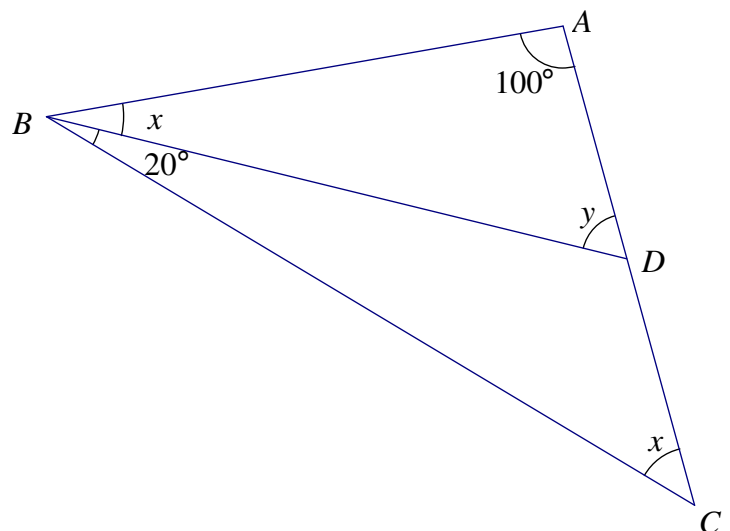
43. Solve the simultaneous equations $\begin{cases} 2x - y = 78 \\ 4x + y = 114 \end{cases}$.

44. The area of a circle is $256\pi \text{ cm}^2$.

- (a) Let the radius of the circle be $r \text{ cm}$. Find the value of r .
- (b) Find the circumference of the circle. Express the answer in terms of π .

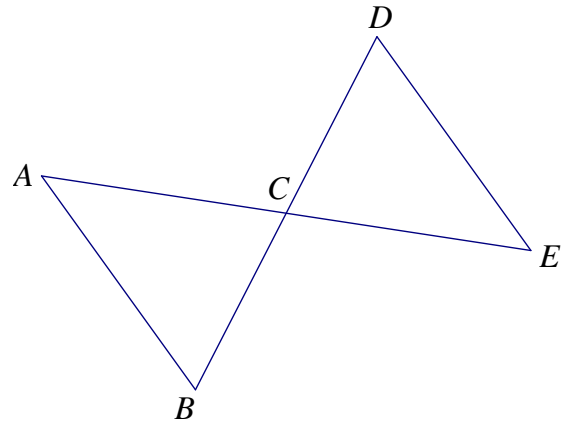


45. In the figure, ADC is a straight line. Find x and y .



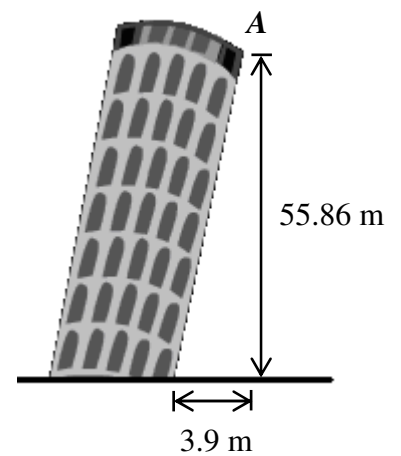
46. In the figure, line segments AE and BD intersect at C ,
 $BC = CD$, $\angle CBA = \angle CDE$.

Prove that $\triangle ABC \cong \triangle EDC$.



47. In the figure, the top, point A , of a leaning tower is 55.86 m from the ground. Due to leaning, point A is off from its original position by 3.9 m horizontally.

Find the angle between the tower and the horizontal, correct to the nearest degree.



48. Thomas is a member of the school basketball team. In ten matches, his scores are as follows:

Match	Score
1 st	3
2 nd	2
3 rd	4
4 th	23
5 th	4
6 th	3
7 th	4
8 th	4
9 th	17
10 th	3

Thomas said, "I usually scored more than 5 in matches, because the arithmetic mean of my scores was 6.7." Is this statement misleading? Explain briefly.

END OF PAPER

