9	M	E	3	(	Q	)

Education Bureau

Territory-wide System Assessment 2010

Secondary 3

Mathematics

QUESTION BOOKLET

INSTRUCTIONS

1. There are 51 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.

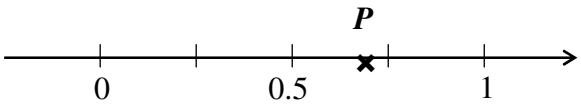
1. $0.059\,59 =$

A. 0.05 (correct to 1 significant figure).
B. 0.05 (correct to 2 decimal places).
C. 0.060 (correct to 3 significant figures).
D. 0.059 6 (correct to 4 decimal places).

2. $3.2\times10^{7} =$

A. 320 000.
B. 3 200 000.
C. 32 000 000.
D. 320 000 000.

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



A. 0.5
B. $\frac{\sqrt{2}}{2}$
C. $\frac{\sqrt{3}}{2}$
D. 1

4. Jacky and his classmates want to buy y tickets of Marine Park. The price of each ticket is \$120. They have a total amount of \$100 to spend. How much do they still owe?

A. $\$(120y - 100)$
B. $\$(100 - 120y)$
C. $\$(100y - 120)$
D. $\$(120 - 100)y$

5. Find the constant term of the polynomial $-5-3x$.

A. 3
B. -3
C. 5
D. -5

6. $3^n \cdot 4^n =$

A. 12^n.
B. 7^n.
C. 12^{2n}.
D. 7^{2n}.

7. Determine whether each of the following is factorization or expansion.

(i)	$4(x-2)$ $= 4x-8$
(ii)	x^2+x-2 $= (x-1)(x+2)$

A. (i) Factorization (ii) Expansion
B. (i) Expansion (ii) Factorization
C. (i) Factorization (ii) Factorization
D. (i) Expansion (ii) Expansion

8. Mrs Lam buys 2 bags of rice and 3 cans of peanut oil from a supermarket for \$310. Mrs Shek buys 3 bags of rice and 4 cans of peanut oil for \$440. Let \$ x be the price of one bag of rice and \$ y be the price of one can of peanut oil. Which of the following pairs of simultaneous equations shows the relations between x and y ?

A. $\begin{cases} 3x+2y=310 \\ 4x+3y=440 \end{cases}$
B. $\begin{cases} 2x+3y=440 \\ 3x+4y=310 \end{cases}$
C. $\begin{cases} 2x+3y=310 \\ 3x+4y=440 \end{cases}$
D. $\begin{cases} 3x+2y=440 \\ 4x+3y=310 \end{cases}$

9. Michael bought a TV set from an electrical shop. The marked price of the product was \$ x , but this price was reduced by \$400 for selling. Michael paid by credit card in 18 installments. Each installment was more than \$600. Which of the following inequalities can be used to find the range of x?

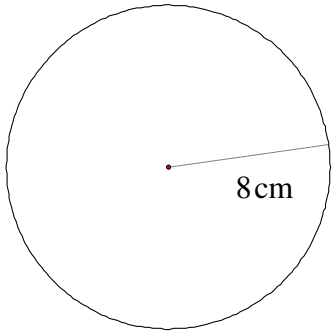
A. $\frac{x-400}{18} > 600$

B. $\frac{x-400}{18} < 600$

C. $\frac{x}{18} - 400 > 600$

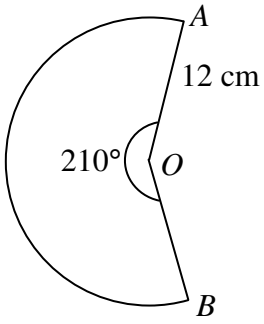
D. $\frac{x}{18} - 400 < 600$

10. The radius of a circle is 8 cm. Find its circumference.



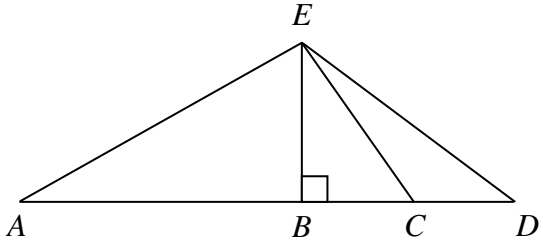
A. 16 cm
B. 64 cm
C. 16π cm
D. 64π cm

11. In the figure, the radius of the sector OAB is 12 cm. Find the length of $\overset{\frown}{AB}$.



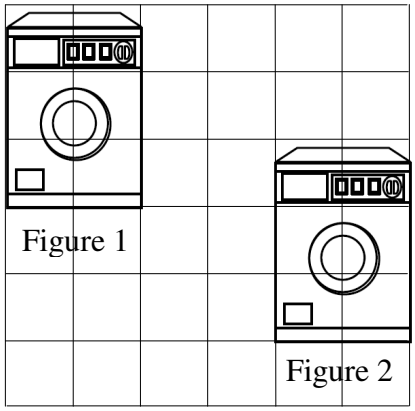
A. 7π cm
B. 14π cm
C. 38π cm
D. 84π cm

12. $ABCD$ is a straight line as shown in the figure. Which of the following is an obtuse angle?



A. $\angle EAB$
B. $\angle ECD$
C. $\angle EBC$
D. $\angle ABC$

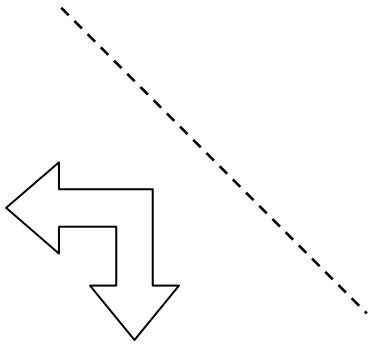
13. Figure 1 is changed to Figure 2 after a single transformation.



The transformation is

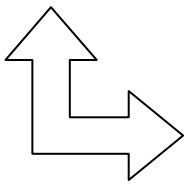
A. rotation.
B. reflection.
C. enlargement.
D. translation.

14.

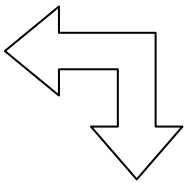


Find the image of the above figure after reflecting along the dotted line.

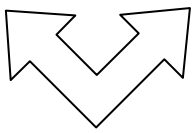
A.



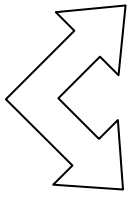
B.



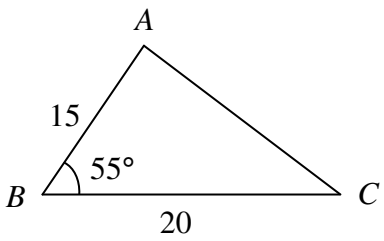
C.

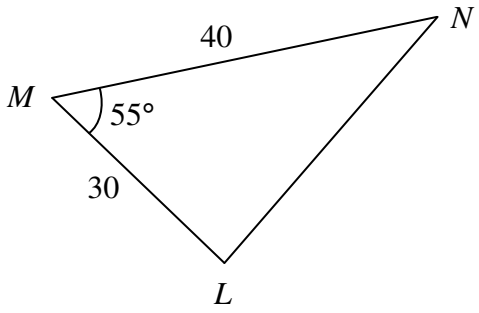


D.



15. According to the figures below, which of the following is correct?





A. $\triangle ABC \cong \triangle MLN$ (SAS)

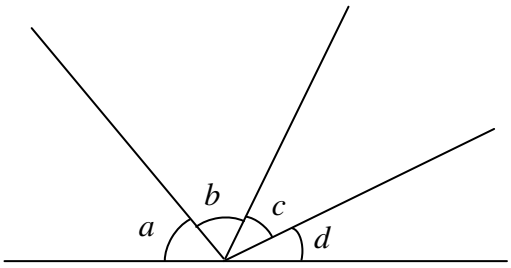
B. $\triangle ABC \cong \triangle LMN$ (SAS)

C. $\triangle ABC \sim \triangle LMN$ (Ratios of 2 sides, included angles)

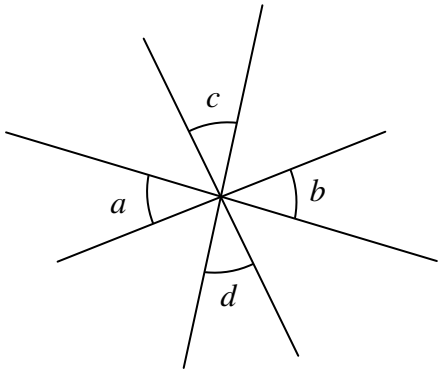
D. $\triangle ABC \sim \triangle MLN$ (Ratios of 2 sides, included angles)

16. Which of the following figures shows that a, b, c and d are angles at a point ($\angle$s at a pt.)?

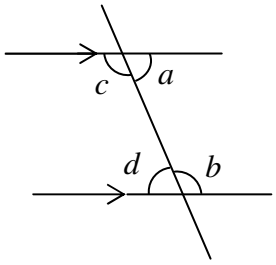
A.



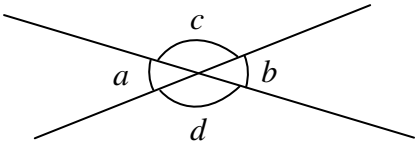
B.



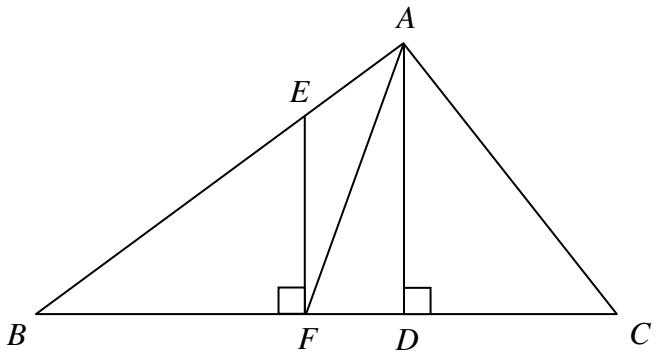
C.



D.

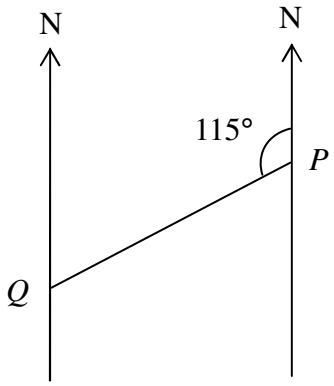


17. In $\triangle ABC$, $BF = FC$, $EF \perp BC$ and $AD \perp BC$. Which of the following is a median of $\triangle ABC$?



A. EF
B. AD
C. AF
D. BF

18. Refer to the figure, find the compass bearing of P from Q.

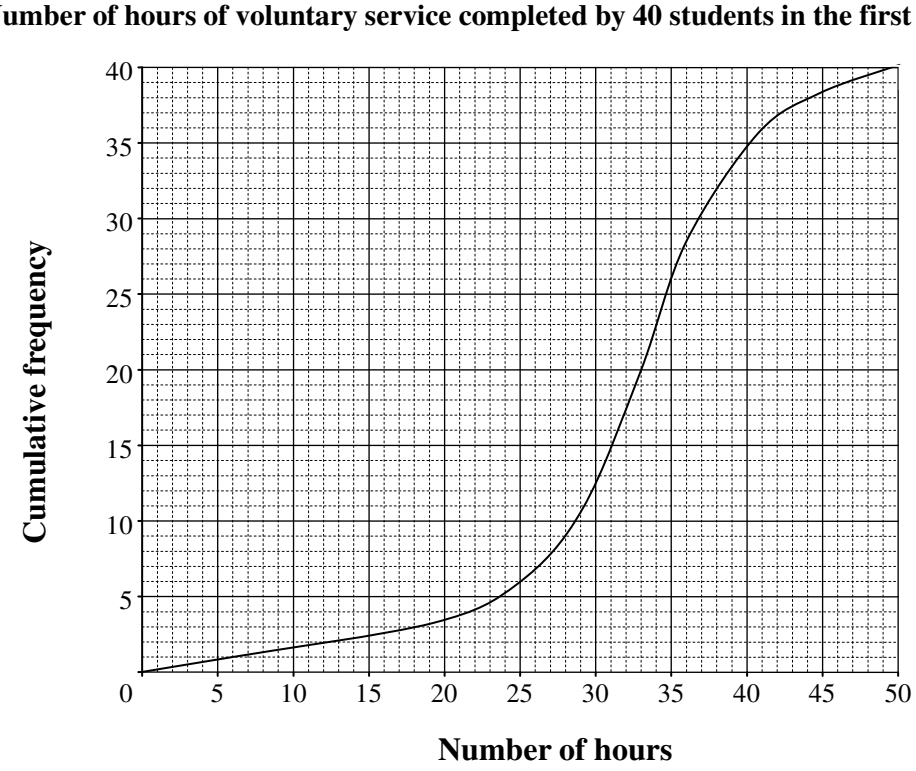


A. S65°W
B. N65°E
C. S25°W
D. N25°E

19. Lacus and his classmates need to collect the volume of traffic of the private cars which use the Cross Harbour Tunnel from 7:00 to 9:00 on Sunday morning. Which of the following is the most suitable method to collect the data?

A. Observe and record the volume of traffic of the private cars at the entrance of the Cross Harbour Tunnel.
B. Give the questionnaires to the drivers of the private cars which use the Cross Harbour Tunnel.
C. Look at the records from the annual report of the company.
D. Interview some citizens by phone.

20. The following cumulative frequency curve represents the number of hours of voluntary service completed by 40 students in the first term.

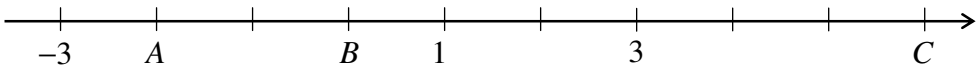


Find the median of the number of hours of voluntary service.

A. 6 hours
B. 20 hours
C. 25 hours
D. 33 hours

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

21. Write down the numbers represented by A, B and C on the number line below.



22. The price of a ferry ticket has increased from \$50 to \$60. Find the percentage increase of the price.

23. The height of Isaac is 180 cm. Isaac is taller than Sharon by 20 cm and Tim is taller than Isaac by 20 cm. Find the ratio of the heights of Sharon and Tim.

24. Rhoda has \$ A for transport expenses every month. Every day she goes to school by minibus and the fare is \$3 each time. Rhoda takes the minibus x times this month and she does not spend all the money for transport by the end of the month.
Write down an inequality to represent the relationship between x and A.

25. According to the pattern of the following sequence, find its n^{th} term.

3 , 9 , 27 , 81 , 243 , . . .

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

27. Factorize $4x^2-9$.

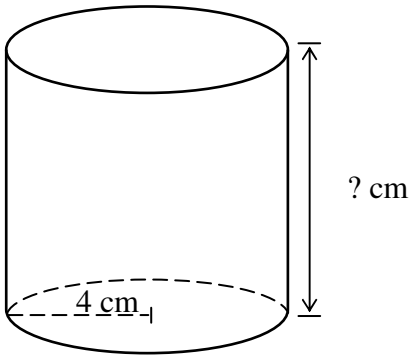
28. Given the formula $d=c+mr^2$. If $d=56$, $c=11$ and $r=-3$, find the value of m.

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

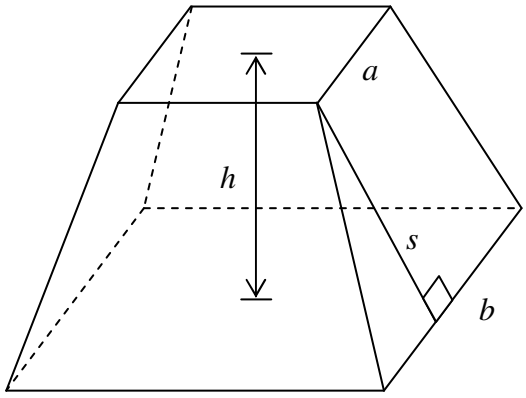
i. $\frac{3}{4}$ ☐ $\frac{3}{2}$

ii. $-\frac{3}{4}$ ☐ $-\frac{3}{2}$

30. The figure shows a right cylinder. Its base radius is 4 cm and its curved surface area is 24 π cm^2. Find the height of the cylinder.



31. In the figure, the top and the base of the right frustum are squares of side lengths a and b respectively. The height of the frustum is h and the height of the lateral planes is s. By considering the dimensions, distinguish the following formulae according to the volume, the surface area, or the total sum of lengths of the frustum.

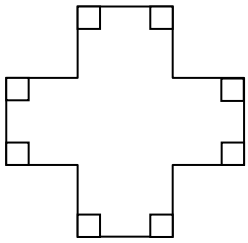


(i) $\dfrac{h(a^2+ab+b^2)}{3}$

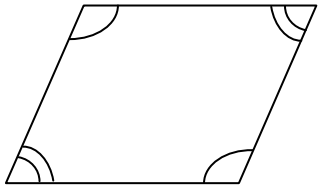
(ii) $(a+b)(2s+a+b)-2ab$

32. Which of the following polygons **MUST** be equiangular? (May be more than one answer)

A.

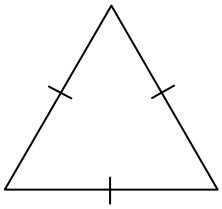


B.

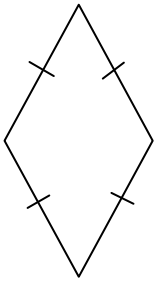


C.

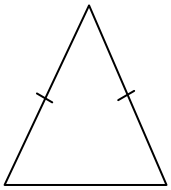
D.



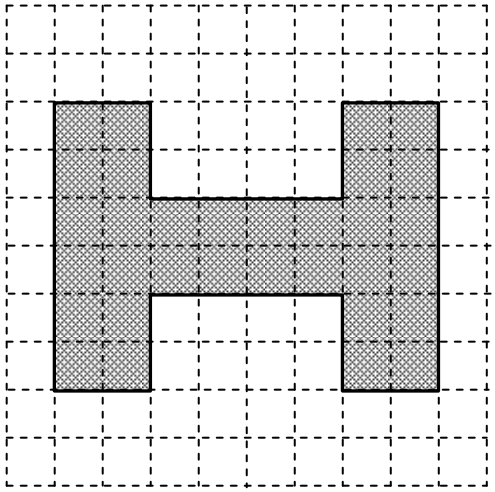
E.



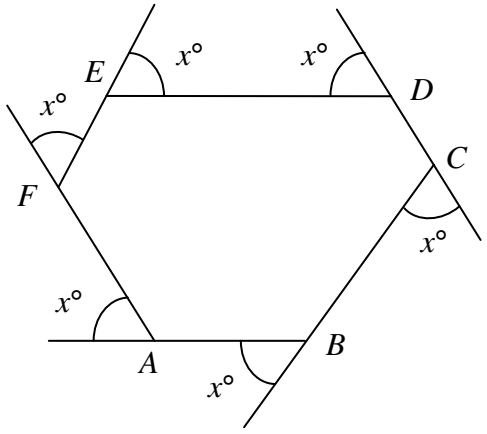
F.



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

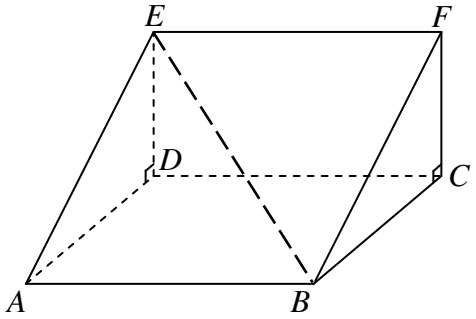


34. In the figure, all exterior angles of hexagon $ABCDEF$ are equal to $x°$.
Find the value of x.

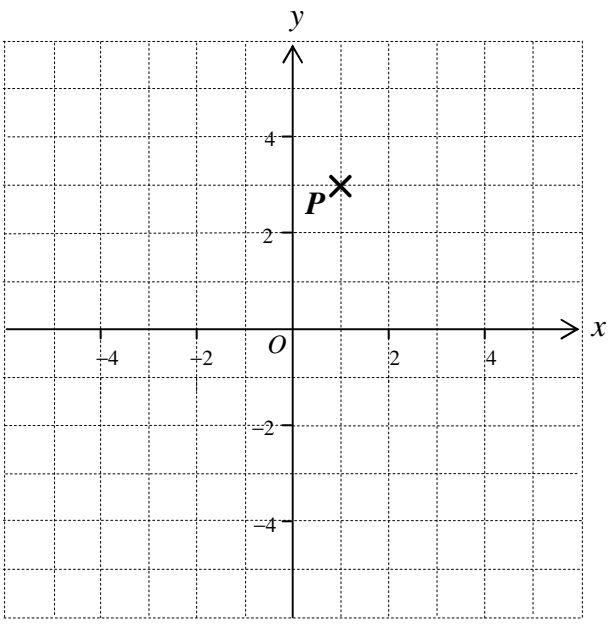


35. Expand $(x^2 - 3x + 1)(2x)$.

36. The figure shows a triangular prism. $ABCD$ and $DCFE$ are rectangles. $ABCD$ is a horizontal plane, and $DCFE$ is a vertical plane. Name the projection of line BE on the plane $ABCD$.



37. Find the coordinates of point $\boldsymbol{P}$ in the figure.

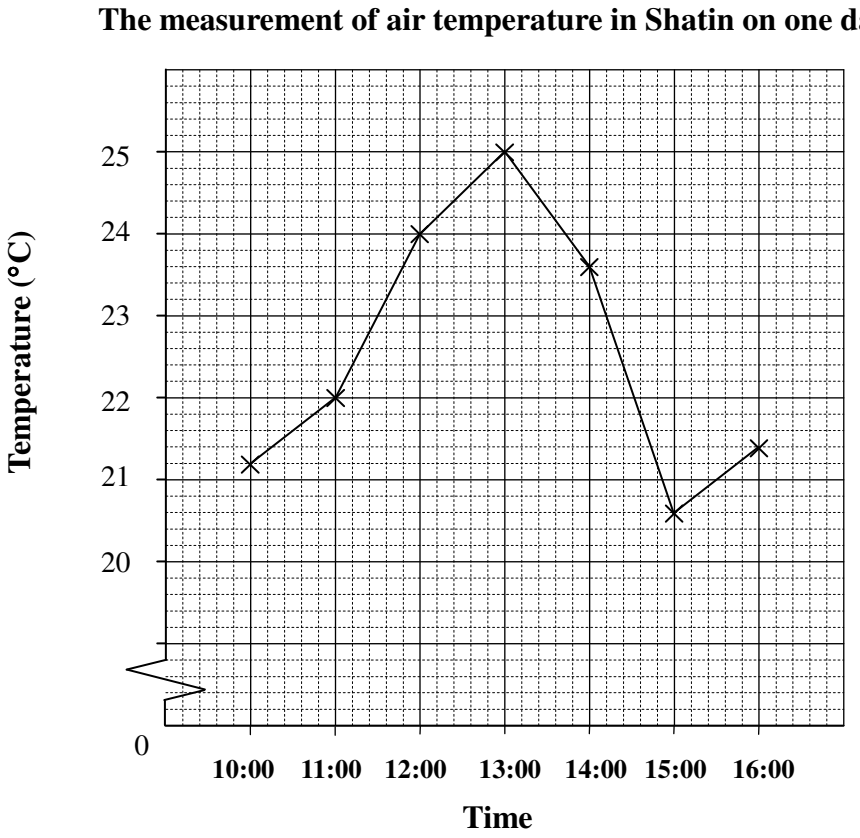


38. Find the distance between two points $A(6\ ,\ -10)$ and $B(-4\ ,\ 14)$ in the rectangular coordinate plane.

39. Isaac plans to study the value of Hong Kong domestic exports for the fourth quarter of 2009. The study is conducted in the following four stages.
Arrange these stages in correct order. For example: (1) → (2) → (3) → (4)

(1) Use a bar chart to represent the value of domestic exports.
(2) Collect the records of Hong Kong domestic exports from the Census and Statistics Department.
(3) Analyze the bar chart and data to reach conclusions.
(4) Organize the value of various kinds of Hong Kong domestic exports.

40. The following chart shows the measurement of air temperature (°C) in Shatin on one day.



According to the above chart, answer the following questions.
(a) At what time was the air temperature of Shatin the lowest ?
(b) What was the difference between the lowest and the highest temperature?
(c) At what time did Shatin have the biggest increase in temperature compared to the temperature one hour before?

41. Find the mode of the following data:

12, 3, 9, 6, 6, 3, 3, 81, 3

42. The residential districts of 200 Secondary 3 students are recorded as follows:

District of residence	Kwun Tong	Wong Tai Sin	Kowloon City	Sai Kung
Number of students	76	58	14	52

A Secondary 3 student is selected randomly. Find the empirical probability that the student lives in **Sai Kung**.

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

43. Kathy deposited \$25 000 in a bank. The interest rate was 4% p.a. compounded yearly. After 2 years, find

(a) the amount that Kathy would receive;
(b) the interest that Kathy would receive.

44. The present value of a machine is \$20 000. The rate of depreciation is 20% in each year. Find the value of the machine after three years.

45. Rainbow factory is required to pay a sewage charge of \$5 240 this year. If the sewage charge is \$1.31 / m^3 of water consumed, find the volume of water (m^3) Rainbow factory consumed this year.

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

x	-2	0	2
y		1	

Draw the graph of this equation on the rectangular coordinate plane given in the **ANSWER BOOKLET**.

47.

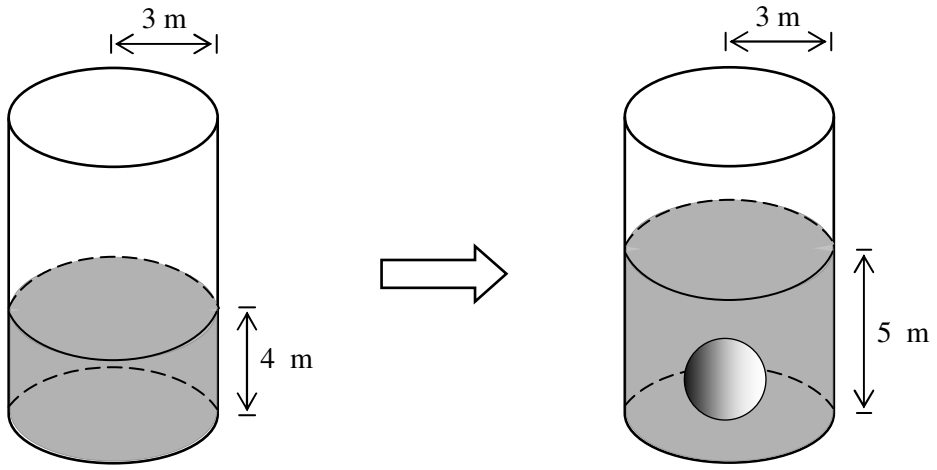
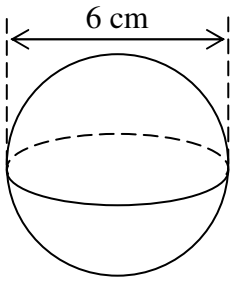


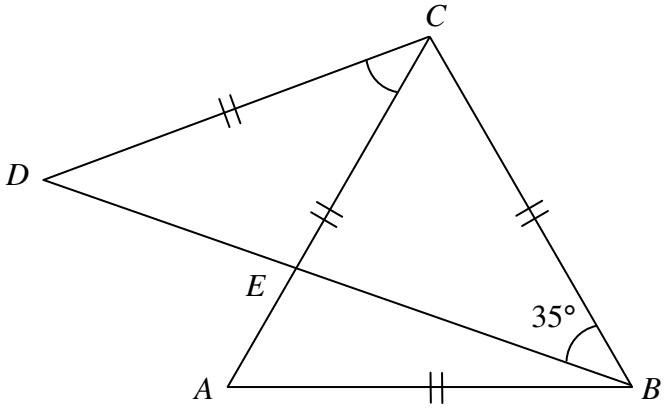
Figure A Figure B

In Figure A, a cylindrical water tank with a base radius of 3 m contains water 4 m deep. If a metal ball is put in the tank and is totally immersed in the water, the water level will rise to 5 m (See Figure B). The volume of the metal ball is V m^3. Find the value of V and express the answer in terms of π.

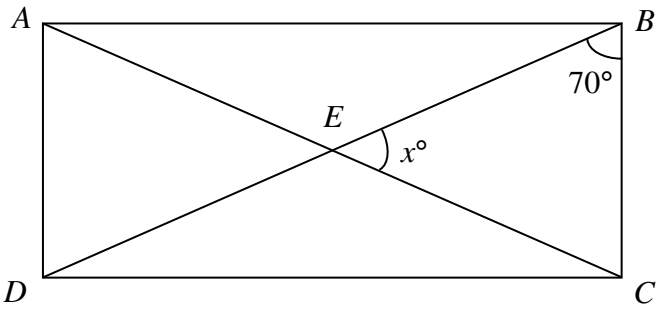
48. The figure shows a sphere of diameter 6 cm. Find the volume of the sphere in terms of π.



49. In the figure , $\triangle ABC$ is an equilateral triangle, $\triangle BCD$ is an isosceles triangle and $\angle CBD = 35°$. Find $\angle ACD$.



50. In the figure, $ABCD$ is a rectangle. E is the point of intersection of the diagonals AC and BD. Find the value of x.



51. The following data show the maximum monthly relative humidity (%) of Beautiful City in 2009.

95 , 83 , 78 , 62 , 56 , 43 , 43 , 45 , 50 , 64 , 70 , 82

Andy claims that the maximum monthly relative humidity of Beautiful City is 43% on average in 2009.

(a) Which average (arithmetic mean, median or mode) does Andy use in his claim?
(b) Do you agree with Andy's claim? Explain your answer.

END OF PAPER

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Prepared by the Hong Kong Examinations and Assessment Authority
2010-TSA-MATH-9ME3(Q)-20