

FORMULAS FOR REFERENCE

SPHERE	Surface area	$= 4\pi r^2$
	Volume	$= \frac{4}{3}\pi r^3$
CYLINDER	Area of curved surface	$= 2\pi rh$
	Volume	$= \pi r^2 h$
CONE	Area of curved surface	$= \pi rl$
	Volume	$= \frac{1}{3}\pi r^2 h$
PRISM	Volume	$= \text{base area} \times \text{height}$
PYRAMID	Volume	$= \frac{1}{3} \times \text{base area} \times \text{height}$

There are 36 questions in Section A and 18 questions in Section B. The diagrams in this paper are not necessarily drawn to scale. Choose the best answer for each question.

Section A

1. $\frac{2^{2n} \cdot 9^n}{3^n} =$

- A. 6^{2n}
- B. 6^{3n}
- C. 12^n
- D. 12^{2n}

2. If $x = \frac{y-2x}{2y}$, then $y =$

- A. $\frac{2x}{1-2x}$
- B. $\frac{2x}{2x-1}$
- C. $\frac{1-2x}{2x}$
- D. $\frac{2x-1}{2x}$

3. If $f(x) = x^2 - x + 1$, then $f(x+1) - f(x) =$

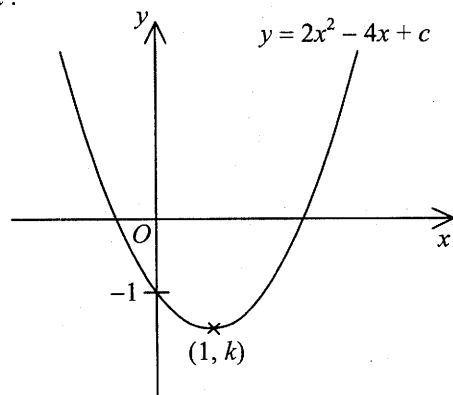
- A. 0.
- B. 2.
- C. $2x$.
- D. $4x$.

4. $\sqrt{25a} - \sqrt{4a} =$

- A. $3\sqrt{a}$.
- B. $7\sqrt{a}$.
- C. $21\sqrt{a}$.
- D. $\sqrt{21a}$.

5. In the figure, the graph of $y = 2x^2 - 4x + c$ passes through the point $(1, k)$. Find the value of k .

- A. -5
- B. -4
- C. -3
- D. -2



6. If the equation $4x^2 + kx + 9 = 0$ has equal positive roots, then $k =$

- A. -6.
- B. 6.
- C. -12.
- D. 12.

7. Solve $x(x-6) = x$.

- A. $x = 6$
- B. $x = 7$
- C. $x = 0$ or $x = 6$
- D. $x = 0$ or $x = 7$

8. If $\begin{cases} pq + 2q = 10 \\ 4p + q = 14 \end{cases}$, then $q =$

- A. 2.
- B. 3.
- C. $\frac{-3}{2}$ or 3.
- D. 2 or 20.

9. The solution of $-2x < 3 - x$ or $3x + 3 > 0$ is

- A. $x > -3$.
- B. $x > -1$.
- C. $-3 < x < -1$.
- D. $x < -3$ or $x > -1$.

10. If $a(2x - x^2) + b(2x^2 - x) \equiv -5x^2 + 4x$, then $a =$

- A. -1 .
- B. 1 .
- C. -2 .
- D. 2 .

11. Let a_n be the n th term of an arithmetic sequence. If $a_1 = 10$ and $a_2 = 13$, then $a_{21} + a_{22} + \dots + a_{30} =$

- A. 765.
- B. 835.
- C. 865.
- D. 1605.

12. The marked price of a book is 20% above the cost. If the book is sold at a 10% discount on the marked price, then the percentage profit is

- A. 2%.
- B. 8%.
- C. 10%.
- D. 18%.

13. If $(a - b) : (b - 2a) = 2 : 3$, then $a : b =$

- A. 3 : 5.
- B. 5 : 3.
- C. 5 : 7.
- D. 7 : 5.

14. A box contains two kinds of coins: \$5 and \$2. The ratio of the number of \$5 coins to the number of \$2 coins is 4 : 5. If the total value of the coins is \$90, then the total number of coins in the box is

- A. 9.
- B. 18.
- C. 27.
- D. 36.

15. The scale of a map is 1 : 20 000 . If two buildings are 3.8 cm apart on the map, then the actual distance between the two buildings is

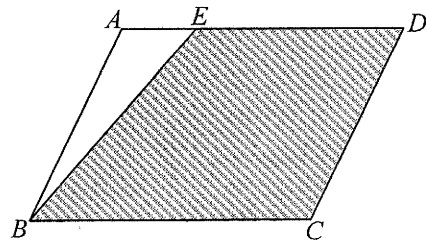
- A. 0.076 km .
- B. 0.76 km .
- C. 7.6 km .
- D. 76 km .

16. It is known that y varies partly as x and partly as \sqrt{x} . When $x = 1$, $y = 4$ and when $x = 4$, $y = 10$. Find y when $x = 16$.

- A. 28
- B. 52
- C. 80
- D. 256

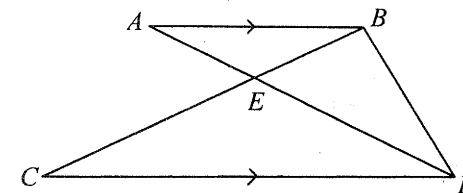
17. In the figure, $ABCD$ is a parallelogram and E is a point on AD such that $AE : ED = 1 : 3$. If the area of $\triangle ABE$ is 3 cm^2 , then the area of the shaded region is

- A. 9 cm^2 .
- B. 15 cm^2 .
- C. 21 cm^2 .
- D. 24 cm^2 .



18. In the figure, AD and BC meet at E . If $CE : EB = 3 : 1$, then area of $\triangle ABD$: area of $\triangle CDE =$

- A. 1 : 1 .
- B. 1 : 3 .
- C. 2 : 3 .
- D. 4 : 9 .



19. If the area of a regular 10-sided polygon is 123 cm^2 , find the length of the side of the 10-sided polygon. Give the answer correct to the nearest 0.1 cm .

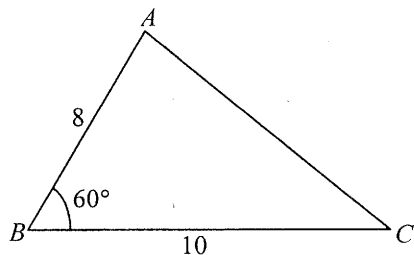
- A. 3.9 cm
- B. 4.0 cm
- C. 6.8 cm
- D. 8.0 cm

20. For $0^\circ \leq x \leq 90^\circ$, the least value of $\frac{4}{2 - \cos x}$ is

- A. 0 .
- B. 1 .
- C. 2 .
- D. 4 .

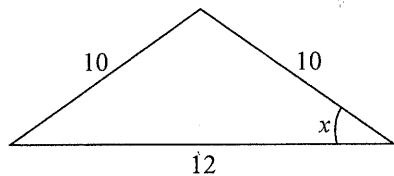
21. In the figure, find AC correct to 2 decimal places.

- A. 5.04
- B. 9.17
- C. 11.14
- D. 15.62



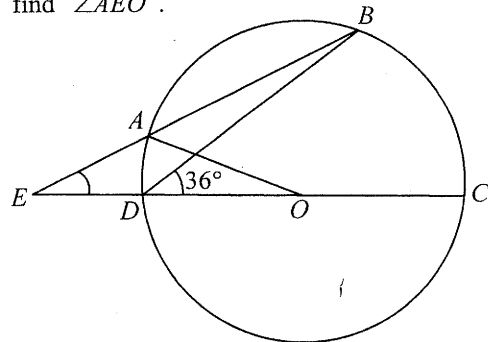
22. In the figure, $\sin x =$

- A. $\frac{4}{3}$
- B. $\frac{3}{4}$
- C. $\frac{3}{5}$
- D. $\frac{4}{5}$



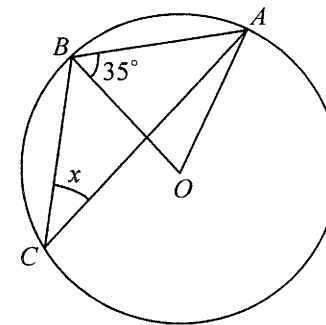
23. In the figure, O is the centre of the circle $ABCD$. If EAB and $EDOC$ are straight lines and $EA = AO$, find $\angle AEO$.

- A. 18°
- B. 24°
- C. 27°
- D. 36°



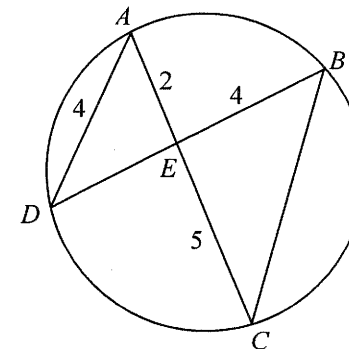
24. In the figure, O is the centre of the circle ABC . Find x .

- A. 17.5°
- B. 27.5°
- C. 35°
- D. 55°



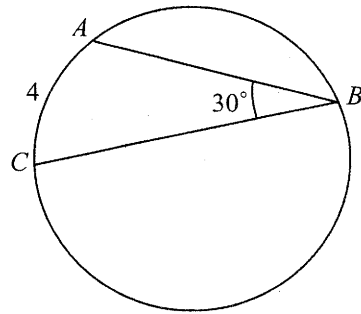
25. In the figure, $ABCD$ is a circle. AC and BD meet at E . If $AD = 4$, $AE = 2$, $EC = 5$ and $BE = 4$, then $BC =$

- A. 6.
- B. 7.
- C. 8.
- D. 10.



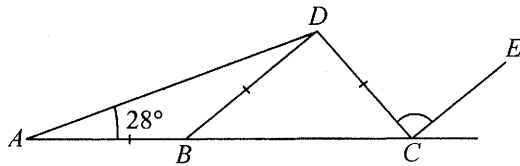
26. In the figure, ABC is a circle. If $\angle ABC = 30^\circ$ and $\widehat{AC} = 4$, then the circumference of the circle is

- A. 24.
B. 48.
C. 8π .
D. 16π .



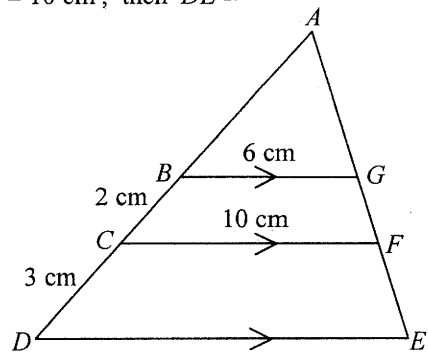
27. In the figure, ABC is a straight line. If $BD \parallel CE$, then $\angle DCE =$

- A. 56° .
B. 68° .
C. 112° .
D. 124° .

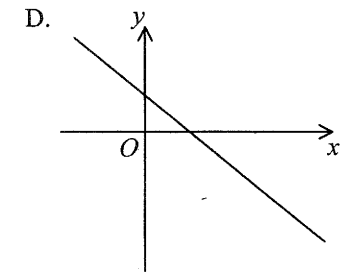
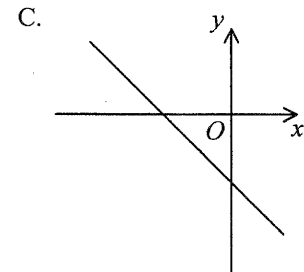
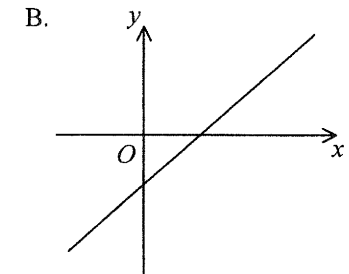
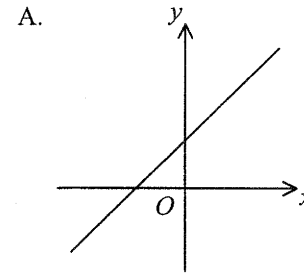


28. In the figure, $ABCD$ and $AGFE$ are straight lines. If $BC = 2$ cm, $CD = 3$ cm, $BG = 6$ cm and $CF = 10$ cm, then $DE =$

- A. 12 cm.
B. 14 cm.
C. 15 cm.
D. 16 cm.

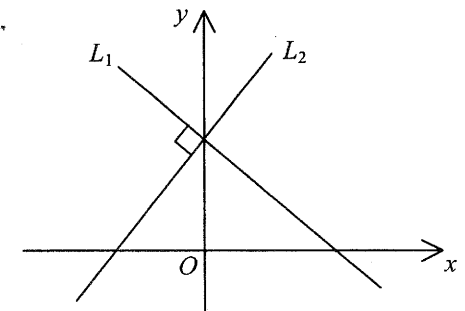


29. If $a > 0$, $b > 0$ and $c < 0$, which of the following may represent the graph of the straight line $ax + by + c = 0$?



30. In the figure, L_1 and L_2 are two straight lines intersecting at a point on the y -axis. If the equation of L_1 is $x + 2y - 2 = 0$, then the equation of L_2 is

- A. $2x - y + 1 = 0$.
B. $2x - y - 2 = 0$.
C. $2x + y + 1 = 0$.
D. $2x + y - 2 = 0$.

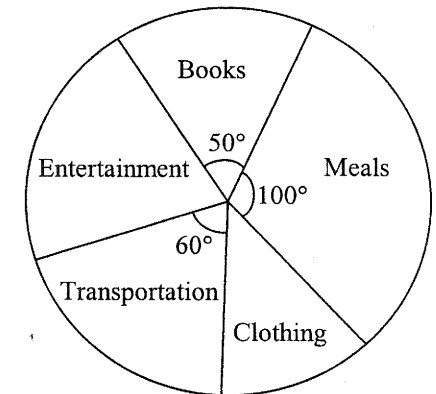


31. If $(-2, 3)$ is the mid-point of $(a, -1)$ and $(4, b)$, then $b =$
- A. -7 .
 B. 7 .
 C. -8 .
 D. 8 .
32. The mean weight of 36 boys and 32 girls is 46 kg . If the mean weight of the boys is 52 kg , then the mean weight of the girls is
- A. 39.25 kg .
 B. 40 kg .
 C. 40.67 kg .
 D. 49 kg .
33. A bag contains 3 red balls and 4 green balls. If two balls are drawn randomly from the bag one by one without replacement, then the probability that the two balls are of different colours is
- A. $\frac{2}{7}$.
 B. $\frac{4}{7}$.
 C. $\frac{12}{49}$.
 D. $\frac{24}{49}$.

34. Peter and May each throws a dart. The probability of Peter's hitting the target is 0.2 . The probability of May's hitting the target is 0.3 . Find the probability of at least one dart hitting the target.
- A. 0.38
 B. 0.44
 C. 0.5
 D. 0.56

35. The pie chart below shows the expenditure of a student in March 2004 . If the student spent \$ 520 on meals, then the student's total expenditure on entertainment and clothing was

- A. \$ 780 .
 B. \$ 1 092 .
 C. \$ 1 352 .
 D. \$ 1 872 .



36. David got 70 marks in a test and his standard score was -0.625 . If the standard deviation of the test marks was 8 marks, then the mean mark of the test was
- A. 62 marks.
 B. 65 marks.
 C. 75 marks.
 D. 78 marks.

Section B

37.
$$\frac{\frac{3}{x} - \frac{2}{y}}{\frac{4x}{y} - \frac{9y}{x}} =$$

A. $\frac{1}{2x-3y}$

B. $\frac{1}{2x+3y}$

C. $\frac{-1}{2x-3y}$

D. $\frac{-1}{2x+3y}$

38. The L.C.M. of $2-b$, $4-b^2$ and $8-b^3$ is

A. $(2-b)(2+b)(4-4b+b^2)$

B. $(2-b)(2+b)(4+4b+b^2)$

C. $(2-b)(2+b)(4-2b+b^2)$

D. $(2-b)(2+b)(4+2b+b^2)$

39. If $5=10^a$ and $7=10^b$, then $\log \frac{7}{50} =$

A. $b-a-1$

B. $b-a+1$

C. $\frac{b}{a}$

D. $\frac{b}{a+1}$

40. If $f(x) = x^3 - 7x + 6$ is divisible by $x^2 - 3x + k$, then $k =$

A. -2

B. 2

C. -3

D. 3

41. It is known that the equation $2x^3 = 12x - 9$ has only one root in the interval $-3 \leq x \leq -2$. The method of bisection is used to find the root starting with the interval $-3 \leq x \leq -2$. After the first approximation, the interval which contains the root becomes $-3 \leq x \leq -2.5$. Find the interval which contains the root after the third approximation.

A. $-2.625 \leq x \leq -2.5$

B. $-2.75 \leq x \leq -2.625$

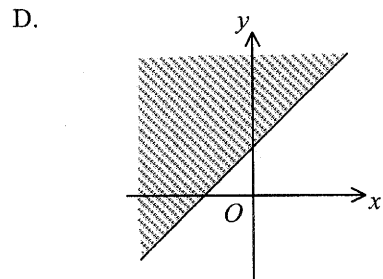
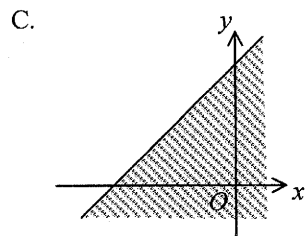
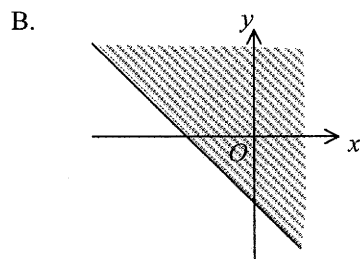
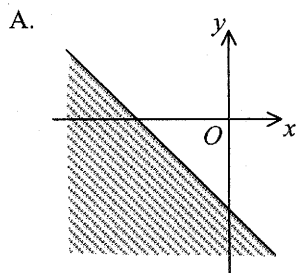
C. $-2.875 \leq x \leq -2.75$

D. $-3 \leq x \leq -2.875$

42. If $\alpha \neq \beta$ and $\begin{cases} \alpha^2 = 4\alpha + 3 \\ \beta^2 = 4\beta + 3 \end{cases}$, then $(\alpha + 1)(\beta + 1) =$

- A. -6.
- B. 0.
- C. 2.
- D. 8.

43. Which of the following shaded regions may represent the solution of $x \leq y - 2$?

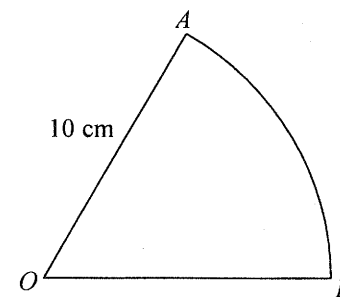


44. If 81, a , b , 3 is a geometric sequence, then $b - a =$

- A. -18.
- B. 18.
- C. -26.
- D. 26.

45. In the figure, OAB is a sector. The perimeter and the area of the sector are x cm and y cm² respectively. If $x = y$, then $\widehat{AB} =$

- A. 5 cm.
- B. 10 cm.
- C. $\frac{5\pi}{3}$ cm.
- D. $\frac{10\pi}{3}$ cm.



46.
$$\frac{\cos\theta - \frac{1}{\cos\theta}}{\sin\theta} =$$

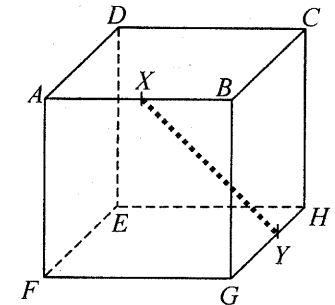
- A. $-\tan\theta$.
- B. $\tan\theta$.
- C. $\frac{-\sin^3\theta}{\cos\theta}$.
- D. $\frac{\cos\theta - 1}{\sin\theta\cos\theta}$.

47. If $A + B = \pi$, which of the following must be true?

- I. $\sin A = \sin B$
 - II. $\cos A = \sin B$
 - III. $\cos A = \cos B$
- A. I only
 - B. II only
 - C. I and III only
 - D. II and III only

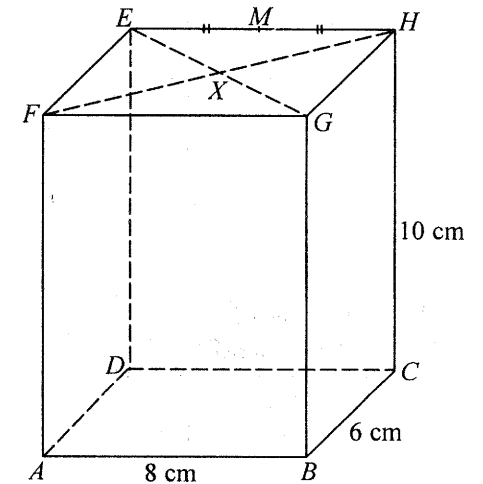
48. The figure shows the cube $ABCDEFGH$ of side 2 cm . X and Y are the mid-points of AB and GH respectively. Find XY .

- A. 3 cm
- B. $2\sqrt{2}$ cm
- C. $\sqrt{5}$ cm
- D. $\sqrt{6}$ cm



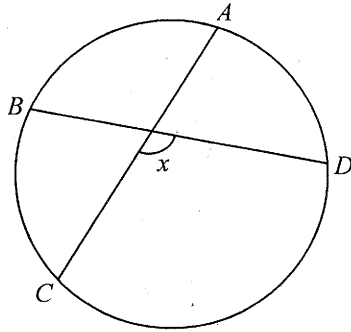
49. In the figure, $ABCDEFGH$ is a rectangular block. EG and FH meet at X . M is the mid-point of EH . Which of the following makes the greatest angle with the plane $ABCD$?

- A. AG
- B. AH
- C. AM
- D. AX



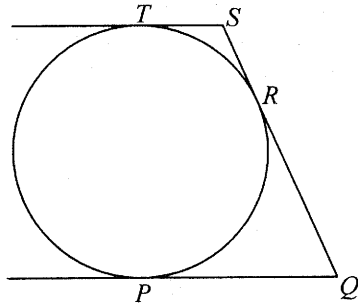
50. In the figure, $ABCD$ is a circle. If $\widehat{CD} = 2\widehat{DA} = 2\widehat{AB} = 2\widehat{BC}$, then $x =$

- A. 108° .
 B. 112° .
 C. 120° .
 D. 144° .



51. In the figure, TS , SQ and QP are tangents to the circle at T , R and P respectively. If $TS \parallel PQ$, $TS = 3$ and $QP = 12$, then the radius of the circle is

- A. 4.5.
 B. 6.
 C. 7.5.
 D. 9.



52. If the straight line $x + y - 3 = 0$ divides the circle $x^2 + y^2 + 2x - ky - 4 = 0$ into two equal parts, then $k =$

- A. -4.
 B. 4.
 C. -8.
 D. 8.

53. The equation of a circle is $x^2 + y^2 - 4x + 2y + 1 = 0$. Which of the following is/are true?

- I. The circle touches the y -axis.
 II. The origin lies outside the circle.
 III. The centre of the circle lies in the second quadrant.

- A. II only
 B. III only
 C. I and II only
 D. I and III only

54. The mean deviation of the four numbers $x - 8$, $x - 2$, $x + 3$ and $x + 7$ is

- A. x .
 B. 0.
 C. 5.
 D. 5.6.

END OF PAPER