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	=	πrl
	Volume	=	$\frac{1}{3}\pi r^2 h$
PRISM	Volume	=	base area × height
PYRAMID	Volume	=	$\frac{1}{3}$ × base area × 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. $\frac{2x-1}{2x}$.

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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. $\sqrt{21a}$.

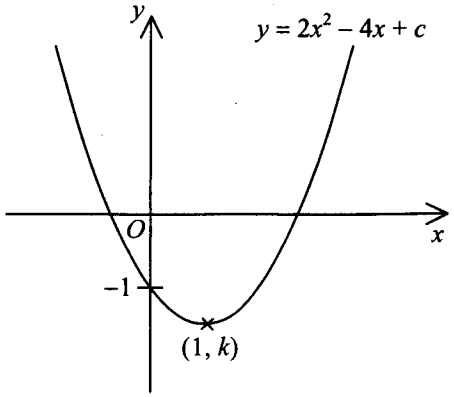
5. In the figure, the graph of $y = 2x^2 - 4x + c$ passes through the point $(1, k)$. Find the value of k.

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.

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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 nth term of an arithmetic sequence. If $a_1 = 10$ and $a_2 = 13$, then $a_{21} + a_{22} + \cdots + a_{30} =$

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.

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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

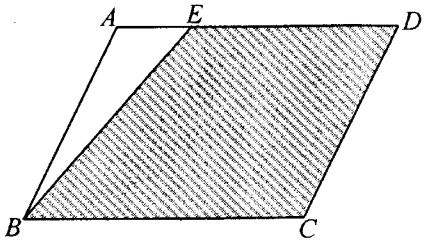
17. In the figure, $ABCD$ is a parallelogram and E is a point on AD such that $AE : ED = 1 : 3$. If the area of ΔABE is 3 cm^2, then the area of the shaded region is

A. 9 cm^2.

B. 15 cm^2.

C. 21 cm^2.

D. 24 cm^2.



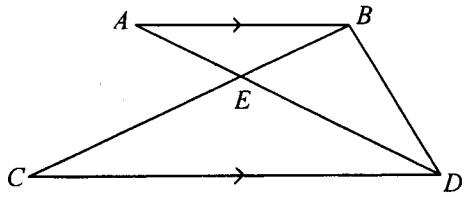
18. In the figure, AD and BC meet at E. If $CE : EB = 3 : 1$, then area of ΔABD : area of ΔCDE =

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 $0° \le x \le 90°$, the least value of $\dfrac{4}{2 - \cos x}$ is

A. 0.

B. 1.

C. 2.

D. 4.

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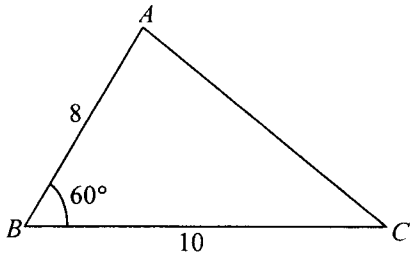
21. In the figure, find AC correct to 2 decimal places.

A. 5.04

B. 9.17

C. 11.14

D. 15.62



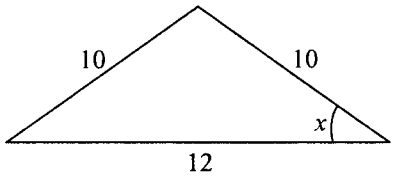
22. In the figure, $\sin x =$

A. $\frac{4}{3}$.

B. $\frac{3}{4}$.

C. $\frac{3}{5}$.

D. $\frac{4}{5}$.



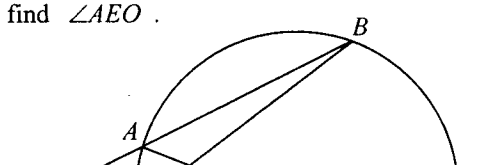
23. In the figure, O is the centre of the circle $ABCD$. If EAB and $EDOC$ are straight lines and $EA = AO$, find $\angle AEO$.

A. 18°

B. 24°

C. 27°

D. 36°



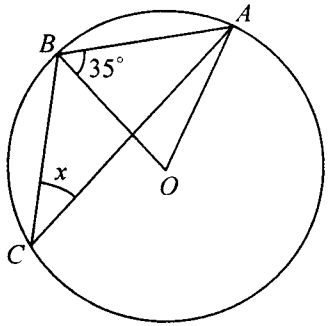
24. In the figure, O is the centre of the circle ABC. Find x.

A. 17.5°

B. 27.5°

C. 35°

D. 55°



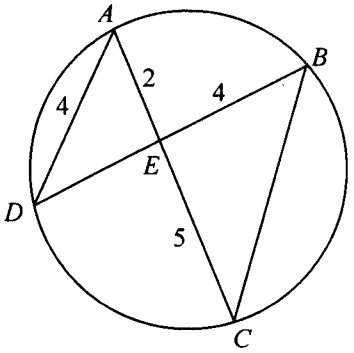
25. In the figure, $ABCD$ is a circle. AC and BD meet at E. If $AD = 4$, $AE = 2$, $EC = 5$ and $BE = 4$, then $BC =$

A. 6.

B. 7.

C. 8.

D. 10.



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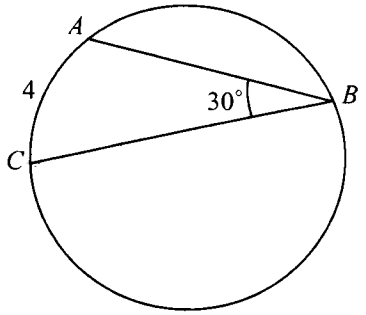
26. In the figure, ABC is a circle. If $\angle ABC = 30°$ and $\overset{\frown}{AC} = 4$, then the circumference of the circle is



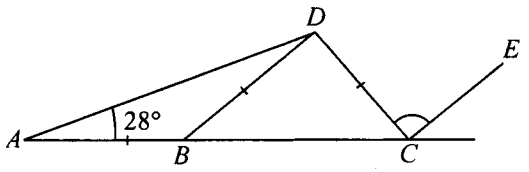
A. 24.

B. 48.

C. 8π.

D. 16π.

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



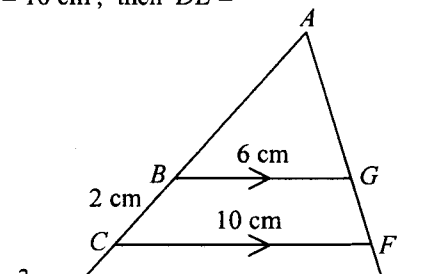
A. 56°.

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.

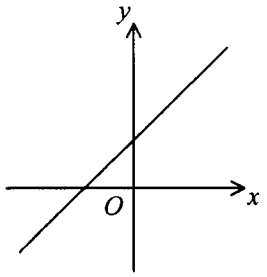
B. 14 cm.

C. 15 cm.

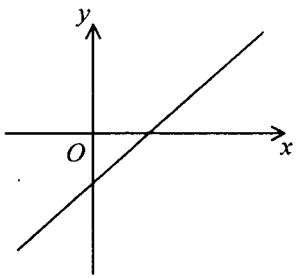
D. 16 cm.

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

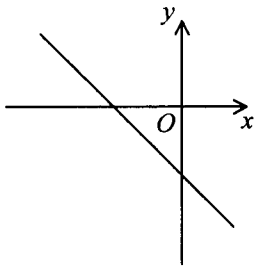
A.



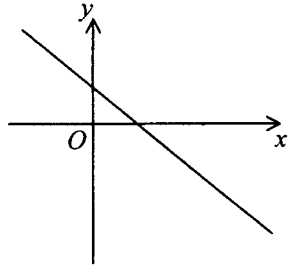
B.



C.



D.



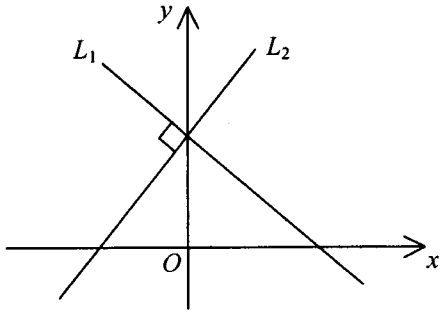
30. In the figure, L_1 and L_2 are two straight lines intersecting at a point on the y-axis. If the equation of L_1 is $x + 2y - 2 = 0$, then the equation of L_2 is

A. $2x - y + 1 = 0$.

B. $2x - y - 2 = 0$.

C. $2x + y + 1 = 0$.

D. $2x + y - 2 = 0$.



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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

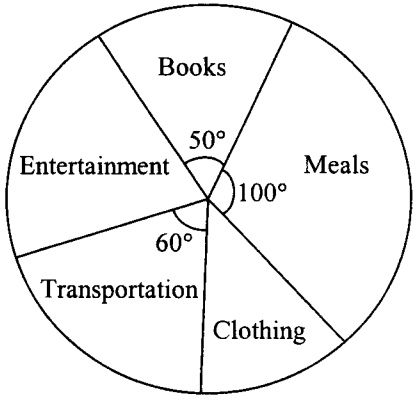
35. The pie chart below shows the expenditure of a student in March 2004. If the student spent \$ 520 on meals, then the student's total expenditure on entertainment and clothing was

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.

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Section B

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

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

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

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

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

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 $\log\dfrac{7}{50} =$

A. $b-a-1$.

B. $b-a+1$.

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

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

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 $-3 \le x \le -2$. The method of bisection is used to find the root starting with the interval $-3 \le x \le -2$. After the first approximation, the interval which contains the root becomes $-3 \le x \le -2.5$. Find the interval which contains the root after the third approximation.

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

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

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

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

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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.

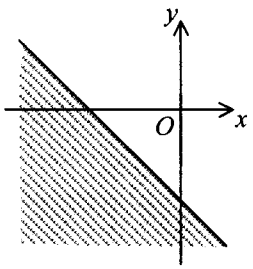
B. 0.

C. 2.

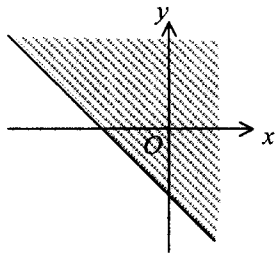
D. 8.

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

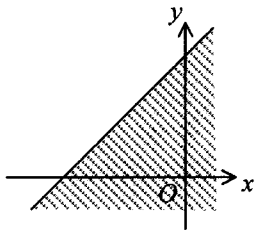
A.



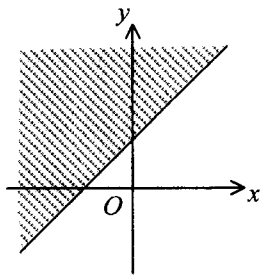
B.



C.



D.



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

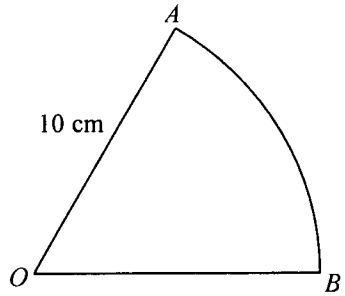
A. -18.

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 cm^2 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.

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

A. $-\tan\theta$.

B. $\tan\theta$.

C. $\dfrac{-\sin^3\theta}{\cos\theta}$.

D. $\dfrac{\cos\theta - 1}{\sin\theta\cos\theta}$.

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

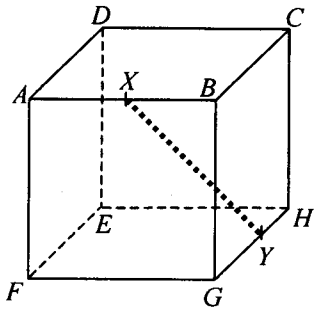
48. The figure shows the cube $ABCDEFGH$ of side 2 cm . X and Y are the mid-points of AB and GH respectively. Find XY .

A. 3 cm

B. $2\sqrt{2}$ cm

C. $\sqrt{5}$ cm

D. $\sqrt{6}$ cm



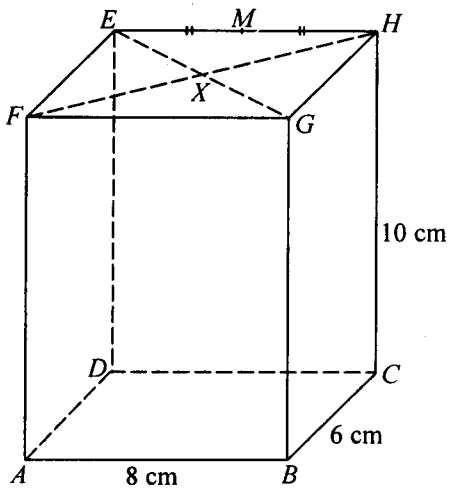
49. In the figure, $ABCDEFGH$ is a rectangular block. EG and FH meet at X. M is the mid-point of EH . Which of the following makes the greatest angle with the plane $ABCD$?

A. AG

B. AH

C. AM

D. AX



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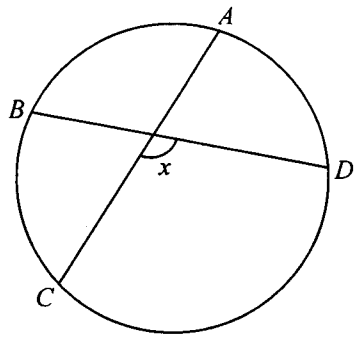
50. In the figure, $ABCD$ is a circle. If $\overset{\frown}{CD} = 2\overset{\frown}{DA} = 2\overset{\frown}{AB} = 2\overset{\frown}{BC}$, then $x =$



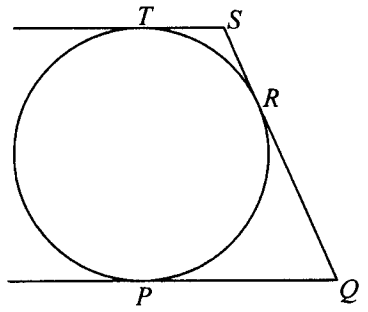
A. $108°$.

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 $TS \,//\, PQ$, $TS = 3$ 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.

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