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.

Section A

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

   A. $a^2 - 2a$.

   B. $a^2 - 3a$.

   C. $a^2 - 3a - 2$.

   D. $a^2 - 1$.

   E. $a^2 - 2$.

$f(x) = x^2 - 1$
$f(a-1) = (a-1)^2 - 1$
$= a^2 - 2a + 1 - 1$
$= a^2 - 2a$.

2. $x^2 - y^2 - x + y =$

   A. $(x-y)(x-y-1)$.

   B. $(x-y)(x+y-1)$.

   C. $(x-y)(x+y+1)$.

   D. $(x+y)(x-y-1)$.

   E. $(x+y)(x-y+1)$.

$x^2 - y^2 - x + y$
$= (x-y)(x+y) - (x-y)$
$= (x-y)(x+y-1)$

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3. If $a=\dfrac{1+b}{1-b}$, then $b=$

A. $\dfrac{a-1}{2}$.

B. $\dfrac{a-1}{2a}$.

C. $\dfrac{a+1}{a-1}$.

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

E. $\dfrac{1-a}{a+1}$.

$a=\dfrac{1+b}{1-b}$

$a(1-b)=1+b$

$a-ab=1+b$

$ab+b=a-1$

$b(a+1)=a-1$

$b=\dfrac{a-1}{a+1}$

4. If $4^x=a$, then $16^x=$

A. $4a$.

B. a^2.

C. a^4.

D. 2^a.

E. 4^a.

$4^x=a$

$16^x=(4^2)^x$

$=4^{2x}$

$=(4^x)^2$

$=a^2$

5. In the figure, the graph of $y=x^2-6x+k$ touches the x-axis. Find k.

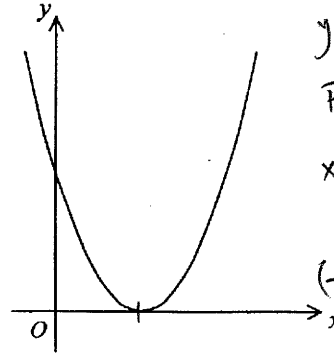
A. $k\geq 0$

B. $k\geq 9$

C. $k=-9$

D. $k=0$

E. $k=9$



$y=x^2-6x+k$

For $y=0$,

$x^2-6x+k=0$

$\Delta=0$

$(-6)^2-4(1)(k)=0$

$4k=36$

$k=9$.

6. If $(3x-1)(x-a)\equiv 3x^2+bx-2$, then

A. $a=2$, $b=-1$.

B. $a=2$, $b=-7$.

C. $a=-2$, $b=5$.

D. $a=-2$, $b=-5$.

E. $a=-2$, $b=-7$.

Method (I)

$(3x-1)(x-a)\equiv 3x^2+bx-2$

put $x=\frac{1}{3}$

$0=3(\frac{1}{3})^2+b(\frac{1}{3})-2$

$\frac{1}{3}b=\frac{5}{3}$

$b=5$.

compare the coef. of constant.

$(-1)(-a)=-2$

$a=-2$.

Method (II)

$(3x-1)(x-a)\equiv 3x^2+bx-2$

$3x^2-x-3ax+a\equiv 3x^2+bx-2$

$3x^2-(1+3a)x+a\equiv 3x^2+bx-2$

Compare the coef.

$a=-2$ $\quad -(1+3a)=b$.

$-[1+3(-2)]=b$

$b=5$.

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7. Solve $x^2+10x-24>0$.

A. $x<-12$ or $x>2$

B. $x<-6$ or $x>-4$

C. $x<-2$ or $x>12$

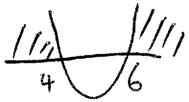
D. $-12<x<2$

E. $-2<x<12$

$x^2+10x-24>0$

$(x-4)(x-6)>0$

$\therefore x<4$ or $x>6$.



8. If $\begin{cases} y=x^2+3x-2 \\ y=-x+3 \end{cases}$, then

A. $x=-1$.

B. $x=-1$ or 5 .

C. $x=-2$ or 1 .

D. $x=-5$ or 1 .

E. $x=-5$ or 8 .

$\begin{cases} y=x^2+3x-\cancel{1}2 \\ y=-x+3 \end{cases}$

$x^2+3x-\cancel{1}2=-x+3$

$x^2+4x-\cancel{1}5=0$

$(x+5)(x-1)=0$

$x=-5$ or 1

When $x=1$.

$y=-1+3$

$y=2$

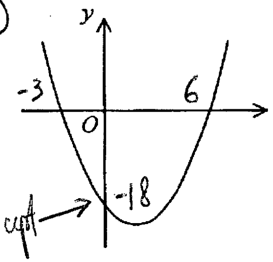
When $x=-5$

$y=5+3$

$=8$

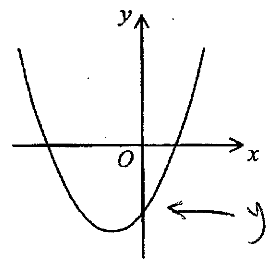
9. Which of the following may represent the graph of $y=x^2-3x-18$?

A.



y-intercept

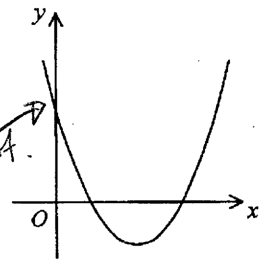
B.



y-intercept

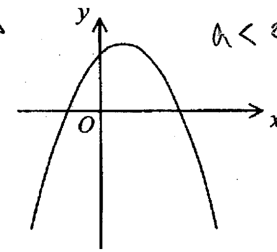
C.

y-intercept.



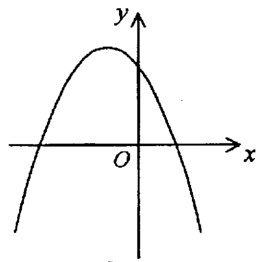
D.

$a<0$



E.

$a<0$



$y=x^2-3x-18$.

since $a=1>0$

$\therefore$ the graph is $\cup$

For $x=0$,

$y=-18$

$\therefore$ y-intercept $=-18<0$

$y=x^2-3x-18$

For $y=0$

$x^2-3x-18=0$

$(x-6)(x+3)=0$

$x=6$ or -3.

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10. The n-th term of an arithmetic sequence is $2+5n$. Find the sum of the first 100 terms of the sequence.

A. 502
B. 12450
C. 25200
D. 25450
E. 25700

$T(n) = 2+5n$.
$a = T(1) = 2+5(1) = 7$.
$l = T(100) = 2+5(100) = 502$
$S(n) = \frac{n}{2}[a+l]$
$= \frac{100}{2}[7+502] = 25450$.

11. In a class, students study either History or Geography, but not both. If the number of students studying Geography is 50% more than those studying History, what is the percentage of students studying History?

A. 25%
B. $33\frac{1}{3}\%$
C. 40%
D. 60%
E. $66\frac{2}{3}\%$

Let x be no. of student study History
y be no. of student study Geog.

$y = (1+50\%)x$
$= 1.5x$.

$\therefore$ % of student studying Hist

$= \frac{x}{x+1.5x} \cdot 100\%$

$= \frac{1}{2.5} \cdot 100\%$

$= 40\%$.

12. If $x:y=3:4$ and $2x+5y=598$, find x .

A. 23
B. 26
C. 69
D. 78
E. 104

Let $x = 3y$, $k \neq 0$.
$y = 4k$.
$2x+5y = 598$
$2(3k)+5(4k) = 598$
$26k = 598$
$\therefore k = 23$
$\therefore x = 3(23)$
$= 69$.

13. If 1 Australian dollar is equivalent to 4.69 H.K. dollars and 100 Japanese yen are equivalent to 5.35 H.K. dollars, how many Japanese yen are equivalent to 1 Australian dollar? Give your answer correct to the nearest Japanese yen.

A. 4
B. 25
C. 88
D. 114
E. 2509

$1 Australian = $4.69 HK

$= \frac{\$4.69 \text{ HK}}{\$5.35 \text{ HK}} \times 100¥$

$= 87.66¥$.

$= 88¥$ (correct to the nearest yen)

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14. Let m be a positive integer. Which of the following must be true?

I. m^2 is even. ✗
II. $m(m+1)$ is even. ✓
III. $m(m+2)$ is even. ✗

A. I only

B. II only

C. III only

D. I and III only

E. II and III only

15. In the figure, the bearing of B from C is

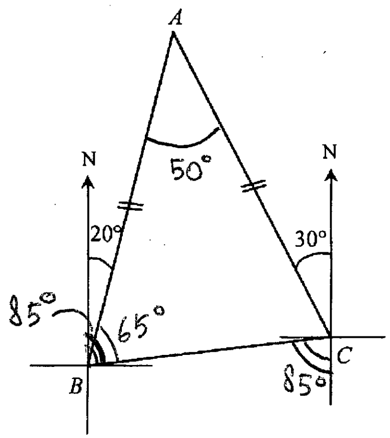
A. N5°E .

B. N65°E .

C. N85°E .

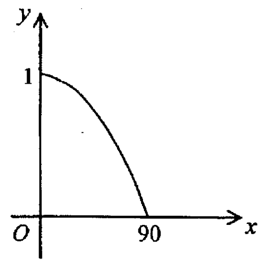
D. S5°W .

E. S85°W .

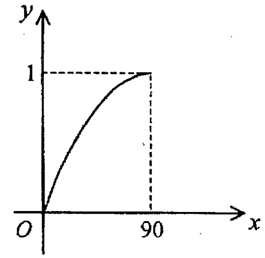


16. Which of the following may represent the graph of $y = \cos x°$ for $0 \le x \le 90$?

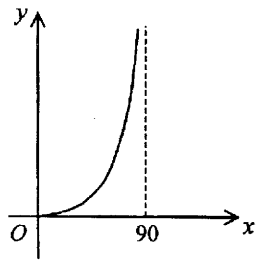
A.



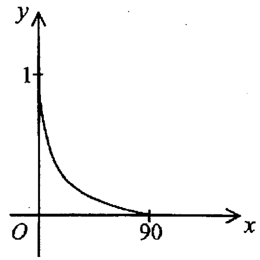
B.



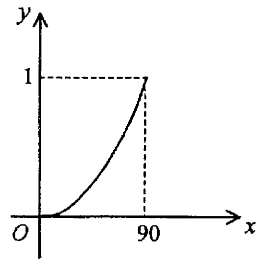
C.



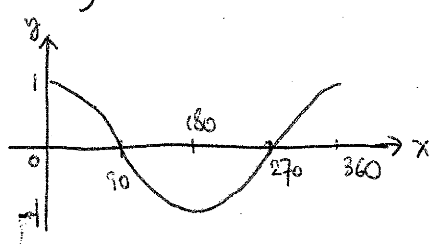
D.



E.



y = cos x



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17. In the figure, find x correct to 3 significant figures.

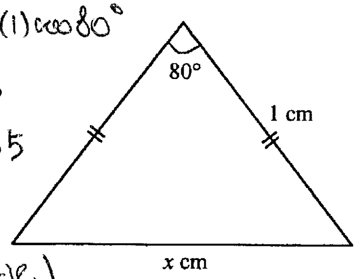
A. 1.28

B. 1.29

C. 1.35

D. 1.53

E. 1.65



$x^2 = 1^2 + 1^2 - 2(1)(1)\cos 80^\circ$

$x^2 = 1.653$

$x = 1.2855$

$= 1.29$

(3 sig. fig.)

18. In the figure, $\frac{AC}{AB} =$

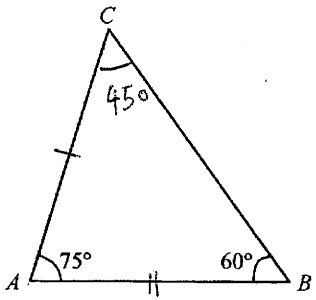
A. $\frac{4}{3}$.

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

C. $\frac{\sqrt{2}}{2}$.

D. $\frac{\sqrt{6}}{2}$.

E. $\frac{\sqrt{6}}{3}$.



$\frac{AC}{\sin 60^\circ} = \frac{AB}{\sin 45^\circ}$

$\frac{AC}{AB} = \frac{\sin 60^\circ}{\sin 45^\circ}$

$= \frac{\sqrt{3}/2}{1/\sqrt{2}}$

$= \frac{\sqrt{6}}{2}$

19. In the figure, find x correct to 1 decimal place.

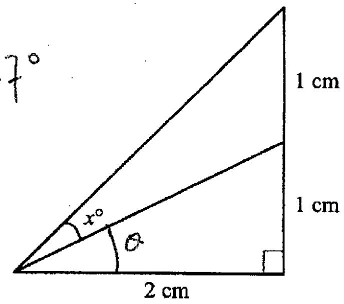
A. 15.0

B. 18.4

C. 22.5

D. 24.1

E. 26.6



$\tan\theta = \frac{1}{2}$

$\theta = 26.57^\circ$

$\tan(\theta + x^\circ) = \frac{2}{2}$

$\tan(\theta + x^\circ) = 1$

$\theta + x^\circ = 45^\circ$

$x^\circ = 18.43^\circ$

20. In the figure, $ABCD$ is a parallelogram. Find $\angle ABC$ correct to the nearest degree.

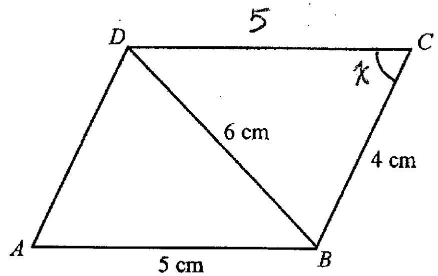
A. 83°

B. 97°

C. 104°

D. 124°

E. 139°



Let $\angle BCD$ be x.

$6^2 = 4^2 + 5^2 - 2(4)(5)\cos x$

$\cos x = \cancel{0.225}\ 0.125$

$x = \cancel{76.997^\circ} = \cancel{77^\circ}$

$\therefore \angle ABC + \angle BCD = 180^\circ$

$\therefore \angle ABC = \cancel{103^\circ}$

21. In the figure, a square is inscribed in a circle with radius 1 cm. Find the area of the shaded region.

$x^2 + x^2 = 2^2$

$2x^2 = 4$

$x^2 = 2$

area of shaded region

$= \pi(1)^2 - x^2$

$= (\pi - 2)$ cm^2

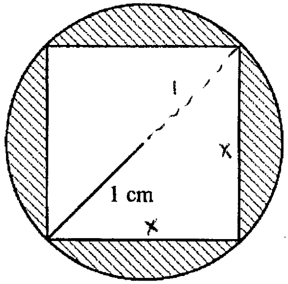
A. $(\pi - 2)$ cm^2

B. $(\pi - \sqrt{2})$ cm^2

C. $(\pi - 1)$ cm^2

D. $(2\pi - 2)$ cm^2

E. $(2\pi - 1)$ cm^2



22. The figure shows a right prism. Find its total surface area.

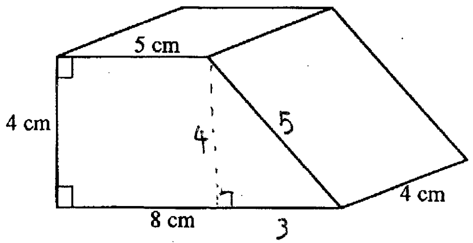
A. 104 cm^2

B. 108 cm^2

C. 114 cm^2

D. 120 cm^2

E. 140 cm^2



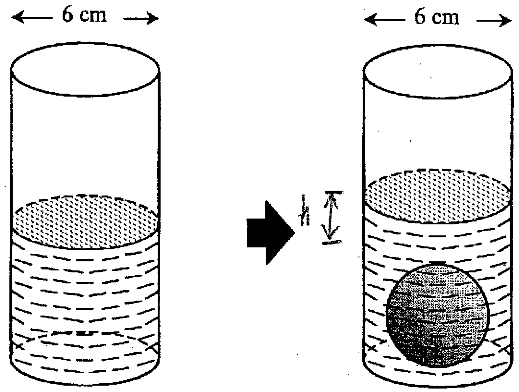
total surface area (totally there are 6 faces)

$= 4\times4 + 5\times4 + 8\times4 + 5\times4 + \frac{4}{2}[5+8]\times2$

$= 16 + 20 + 32 + 20 + 52$

$= 140$ cm^2

23. In the figure, a cylindrical vessel of internal diameter 6 cm contains some water. A steel ball of radius 2 cm is completely submerged in the water. Find the rise in the water level.



A. $\frac{32}{27}$ cm

B. $\frac{8}{27}$ cm

C. $\frac{16}{9}$ cm

D. $\frac{4}{9}$ cm

E. $\frac{8}{3}$ cm

Let h be the rise of water level.

vol of sphere = vol. of the rise of water level

$\frac{4}{3}\pi(2)^3 = \pi(\frac{6}{2})^2 h$.

$\frac{32}{3}\pi = 9\pi h$

$h = \frac{32}{27}$

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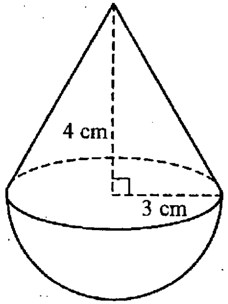
24. In the figure, the solid consists of a right circular cone and a hemisphere with a common base. Find the volume of the solid.

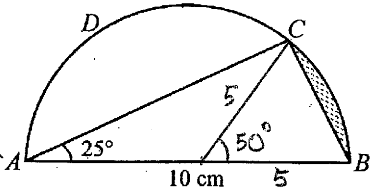
A. $30\pi\ \text{cm}^3$
B. $33\pi\ \text{cm}^3$
C. $48\pi\ \text{cm}^3$
D. $54\pi\ \text{cm}^3$
E. $72\pi\ \text{cm}^3$

vol. of solid
$= \frac{1}{3}\pi(3)^2(4) + \frac{1}{2}\times\frac{4}{3}\pi(3)^3$
$= 12\pi + 18\pi$
$= 30\pi$



25. In the figure, $ABCD$ is a semicircle. Find the area of the shaded region correct to the nearest $0.01\ \text{cm}^2$.

A. $5.33\ \text{cm}^2$
B. $2.87\ \text{cm}^2$
C. $2.67\ \text{cm}^2$
D. $1.33\ \text{cm}^2$
E. $0.17\ \text{cm}^2$

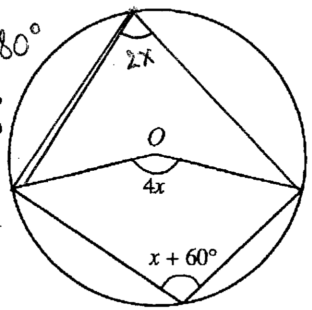


the shaded area
$= \pi(5)^2\left(\frac{50°}{360°}\right) - \frac{1}{2}(5)^2\sin 50°$
$= (10.91 - 9.58)\ \text{cm}^2 = 1.33\ \text{cm}^2$

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

A. 12°
B. 20°
C. 24°
D. 40°
E. 60°

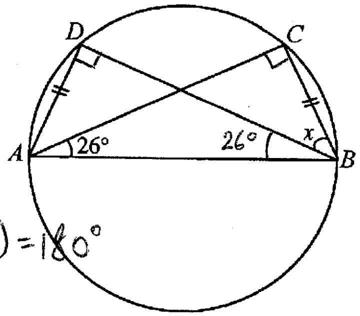
$2x + (x+60°) = 180°$
$3x + 60° = 180°$
$3x = 120°$
$x = 40°$.



27. In the figure, AB is a diameter of the circle. Find x.

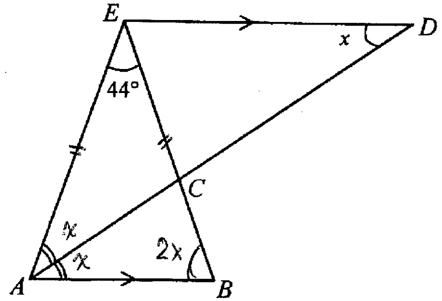
A. 26°
B. 32°
C. 38°
D. 52°
E. 64°

$\triangle ABD \cong \triangle BAC$ (AAS)
$\therefore \angle DBA = 26°$
$\therefore$
$26° + 90° + (x + 26°) = 180°$
$x = 38°$



28. In the figure, ACD and ECB are straight lines. If $\angle EAC = \angle CAB$ and $EA = EB$, find x.

A. 22°
B. 34°
C. 44°
D. 46°
E. 68°



$2x + 2x + 44° = 180°$
$4x + 44° = 180°$
$x = 34°$.

29. In the figure, $ABCDE$ is a regular pentagon and $ABFG$ is a square. Find x.

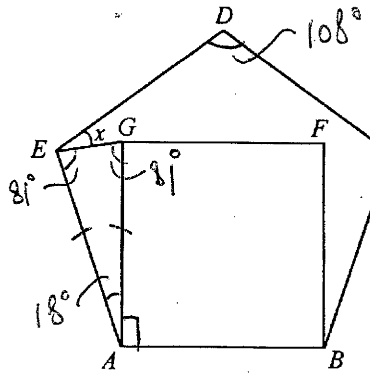
A. 18°

B. 27°

C. 30°

D. 36°

E. 45°



30. In the figure, AEB and ADC are straight lines. Find ED.

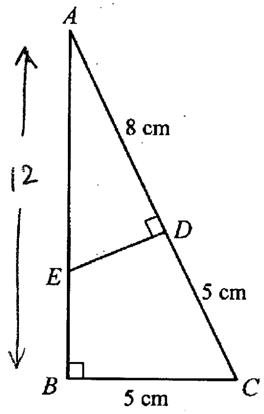
A. $\frac{10}{3}$ cm

B. $\frac{40}{13}$ cm

C. 3 cm

D. $\sqrt{40}$ cm

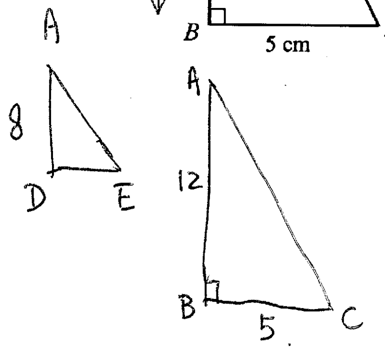
E. $\sqrt{80}$ cm



$AB^2 + 5^2 = 13^2$

$AB^2 = 144$

$AB = 12$



$\frac{DE}{5} = \frac{8}{12}$

$DE = \frac{10}{3}$ cm

31. $A(-4, 2)$ and $B(1, -3)$ are two points. C is a point on the y-axis such that $AC = CB$. Find the coordinates of C.

A. $(-\frac{3}{2}, -\frac{1}{2})$

B. $(-1, 0)$

C. $(1, 0)$

D. $(0, -1)$

E. $(0, 1)$

let C be $(0, y)$

$(-4-0)^2 + (+2-y)^2 = (1-0)^2 + (-3-y)^2$

$16 + 4 - 4y + y^2 = 1 + 9 + 6y + y^2$

$10y = 10$

$y = 1$

$\therefore C = (0, 1)$

32. In the figure, $OABC$ is a parallelogram. If the equation of OC is $2x - y = 0$ and the length of CB is 3, find the equation of AB.

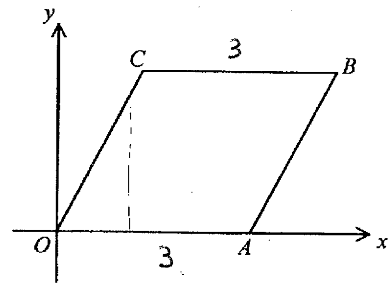
A. $x - 2y - 3 = 0$

B. $2x - y - 3 = 0$

C. $2x - y + 3 = 0$

D. $2x - y - 6 = 0$

E. $2x - y + 6 = 0$



$\therefore A = (3, 0)$.

Since $OC \parallel AB$

$m_{OC} = m_{AB} = 2$

$m_{AB} = 2$.

eqt. of AB.

$(y-0) = 2(x-3)$

$y = 2x - 6$.

$2x - y - 6 = 0$

33. Find the median and mode of the ten numbers
6 , 8 , 3 , 3 , 5 , 5 , 5 , 7 , 7 , 11 .

A. median = 5 , mode = 5

B. median = 5 , mode = 5.5

C. median = 5.5 , mode = 5

D. median = 5.5 , mode = 6

E. median = 6 , mode = 5

3, 3, 5, 5, 5, 6, 7, 7, 8, 11
median

median = 5.5
mode = 5

34. A student scored 50 marks in a test and the corresponding standard score is −0.5 . If the mean of the test scores is 60 marks, find the standard deviation of the scores.

A. $\sqrt{20}$ marks

B. 5 marks

C. 9.5 marks

D. 10 marks

E. 20 marks

$z = \frac{x - \bar{x}}{\sigma}$

$-0.5 = \frac{50-60}{\sigma}$

$-0.5\sigma = -10$

$\sigma = 20$

35. Two cards are drawn randomly from four cards numbered 1 , 2 , 3 and 4 respectively. Find the probability that the sum of the numbers drawn is odd.

A. $\frac{1}{6}$

B. $\frac{1}{4}$

C. $\frac{1}{3}$

D. $\frac{1}{2}$

E. $\frac{2}{3}$

P(the sum of nos. is odd)

= P(OE or EO)

$= (\frac{2}{4})(\frac{2}{3}) + (\frac{2}{4})(\frac{2}{3})$

$= \frac{1}{3} + \frac{1}{3}$

$= 2/3$

36. Tom and Mary each throws a dart. The probability of Tom's dart hitting the target is $\frac{1}{3}$ while that of Mary's is $\frac{2}{5}$. Find the probability of only one dart hitting the target.

A. $\frac{2}{15}$

B. $\frac{3}{15}$

C. $\frac{7}{15}$

D. $\frac{11}{15}$

E. $\frac{13}{15}$

P(only one dart hitting the target)

= P(JM' or J'M)

$= (\frac{1}{3})(\frac{3}{5}) + (\frac{2}{3})(\frac{2}{5})$

$= \frac{7}{15}$

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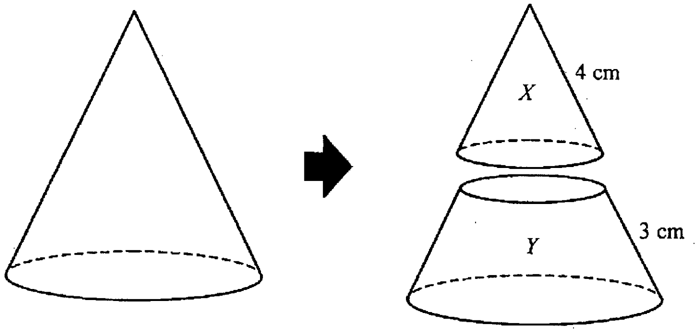
Section B

37. In the figure, a right circular cone is divided into two parts X and Y by a plane parallel to the base such that the lengths of their slant edges are 4 cm and 3 cm respectively. Find the ratio of the curved surface areas of X and Y.



A. 16 : 9

B. 16 : 33

C. 16 : 49

D. 64 : 27

E. 64 : 279

$A_X : A_{(X+Y)} = 4^2 : 7^2$
$= 16 : 49$
$\therefore A_X : A_Y = 16 : 33$

38. It is given that $F(x) = x^3 - 4x^2 + ax + b$. $F(x)$ is divisible by $x-1$. When it is divided by $x+1$, the remainder is 12. Find a and b.

A. $a = 5$, $b = 10$

B. $a = 1$, $b = 2$

C. $a = -3$, $b = 6$

D. $a = -4$, $b = 7$

E. $a = -7$, $b = 10$

$F(1) = 0$
$1^3 - 4(1)^2 + a(1) + b = 0$
$a + b - 3 = 0$ — ①
$F(-1) = 12$
$(-1)^3 - 4(-1)^2 + a(-1) + b = 12$
$a - b + 17 = 0$ — ②
$\therefore a = -7$ & $b = 10$

39. If $\frac{1}{2}\log y = 1 + \log x$, then

A. $y = \sqrt{10x}$.

B. $y = 100 + x^2$.

C. $y = (10+x)^2$.

D. $y = 10x^2$.

E. $y = 100x^2$.

$\frac{1}{2}\log y = 1 + \log x$
$\frac{1}{2}\log y = \log 10 + \log x$
$\log y^{\frac{1}{2}} = \log 10x$
$y^{\frac{1}{2}} = 10x$
$y = (10x)^2$
$y = 100x^2$

40. $\frac{2}{x^2-1} - \frac{x-1}{x^2-2x-3} =$

A. $\frac{-x^2+2x+5}{(x-1)(x+1)(x+3)}$.

B. $\frac{-x^2+2x+7}{(x-1)(x+1)(x+3)}$.

C. $\frac{-x^2-5}{(x-3)(x-1)(x+1)}$.

D. $\frac{x^2-5}{(x-3)(x-1)(x+1)}$.

E. $\frac{-x^2+4x-7}{(x-3)(x-1)(x+1)}$.

$\frac{2}{x^2-1} - \frac{x-1}{x^2-2x-3}$
$= \frac{2}{(x-1)(x+1)} - \frac{x-1}{(x-3)(x+1)}$
$= \frac{2(x-3) - (x-1)^2}{(x-1)(x+1)(x-3)}$
$= \frac{2x-6 - (x^2-2x+1)}{(x-1)(x+1)(x-3)}$
$= \frac{-x^2 + x - }{(x-1)(x+1)(x-3)}$
$=$

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41. The method of bisection is used to find the root of $\sin x + x - 1 = 0$ starting with the interval $[0, 2]$. After the first approximation, the interval which contains the root becomes $[0, 1]$. Find the interval which contains the root after the third approximation.

A. $[0, 0.25]$

B. $[0.25, 0.75]$

C. $[0.5, 0.75]$

D. $[0.5, 1]$

E. $[0.75, 1]$

interval	$c = \frac{a+b}{2}$	$f(a)$	$f(b)$	$f(c)$	
$0 < x < 2$	1	−	+	+	← 1st
$0 < x < 1$	0.5	−	+	−	← 2nd
$0.5 < x < 1$	0.75	−	+	−	← 3rd
$0.5 < x < 0.75$	0.625	−	+	−	

42. John goes to school and returns home at speeds x km/h and $(x + 1)$ km/h respectively. The school is 2 km from John's home and the total time for the two journeys is 54 minutes. Which of the following equations can be used to find x?

A. $\frac{x}{2} + \frac{x+1}{2} = \frac{54}{60}$

B. $\frac{2}{x} + \frac{2}{x+1} = \frac{54}{60}$

C. $\frac{\frac{1}{2}[x+(x+1)]}{4} = \frac{54}{60}$

D. $\frac{4}{\frac{1}{2}[x+(x+1)]} = \frac{54}{60}$

E. $2x + 2(x+1) = \frac{54}{60}$

Time for John goes to school

$= \frac{\text{Distance}}{\text{speed}}$

$= \frac{2}{x}$ hr

Time for John returns to school.

$= \frac{2}{x+1}$ hr

$\therefore \frac{2}{x} + \frac{2}{x+1} = \frac{54}{60}$.

43. In the figure, find the point (x, y) in the shaded region (including the boundary) at which $bx - ay + 3$ attains its greatest value.

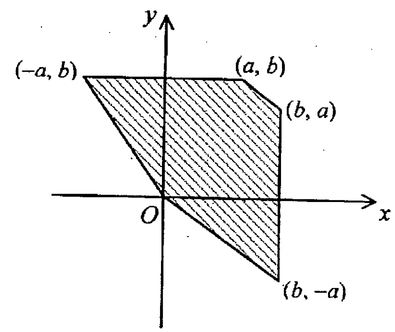
A. $(0, 0)$

B. $(-a, b)$

C. (a, b)

D. $(b, -a)$

E. (b, a)



44. The sum of the first two terms of a geometric sequence is 3 and the sum to infinity of the sequence is 4. Find the common ratio of the sequence.

A. $-\frac{1}{7}$

B. $\frac{1}{7}$

C. $\frac{1}{4}$

D. $-\frac{1}{2}$

E. $-\frac{1}{2}$ or $\frac{1}{2}$

$S(2) = 3$

$a + aR = 3$.

$a(1+R) = 3$. ——①

$S(\infty) = 4$

$\frac{a}{1-R} = 4$ ——②

$\frac{①}{②}$ $\frac{a(1+R)}{a/1-R} = \frac{3}{4}$.

$(1+R)(1-R) = \frac{3}{4}$.

$1 - R^2 = \frac{3}{4}$

$R^2 = \frac{1}{4}$

$R = \pm\frac{1}{2}$

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45. It is given that y varies inversely as x^3. If x is increased by 100%, then y is

A. increased by 800%.

B. increased by 700%.

C. decreased by 300%.

D. decreased by 87.5%.

E. decreased by 12.5%.

$y = \frac{k}{x^3}$

$x \xrightarrow{+100\%} x_1$

$x_1 = 2x$.

$y_1 = \frac{k}{x_1^3}$

$y_1 = \frac{k}{(2x)^3}$

$y_1 = 0.125 \frac{k}{x^3}$

$= 0.125y$.

% change

$= \frac{y_1 - y}{y} \cdot 100\%$

$= \frac{0.125y - y}{y} \cdot 100\%$

$= 87.5\%$

46. $\frac{\cos(90^\circ - A)\cos(-A)}{\sin(360^\circ - A)} =$

A. $-\cos A$.

B. $\cos A$.

C. $\sin A$.

D. $-\frac{\cos^2 A}{\sin A}$.

E. $\frac{\cos^2 A}{\sin A}$.

$\frac{\cos(90^\circ - A)\cos(-A)}{\sin(360^\circ - A)}$

$= \frac{\sin A \cdot \cos A}{-\sin A}$

$= -\cos A$.

47. If $0 \le \theta \le 2\pi$, solve $(\cos\theta - 3)(3\sin\theta - 2) = 0$ correct to 3 significant figures.

A. 0.730 or 1.23

B. 0.730 or 2.41

C. 0.730 or 3.87

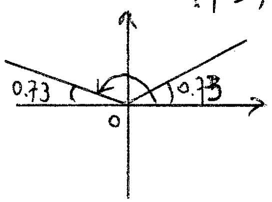
D. 0.730 or 6.21

E. 0.734 or 2.41

$(\cos\theta - 3)(3\sin\theta - 2) = 0$

$\cos\theta = 3$ (rejected) or $\sin\theta = 2/3$

$\theta = 0.73$,

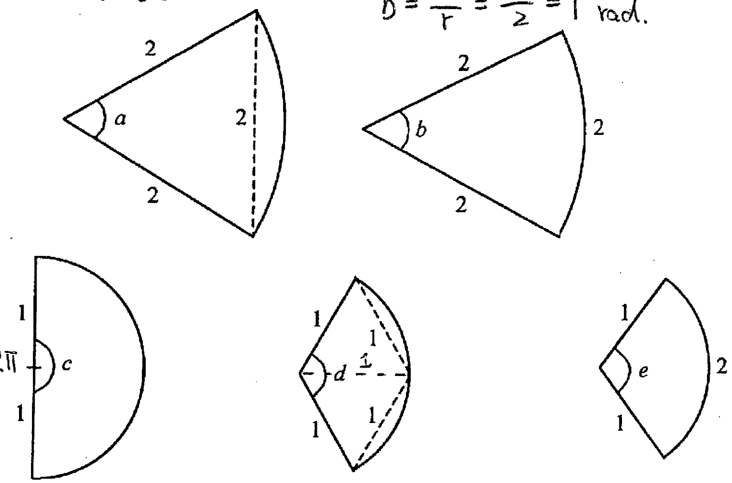


48. The figure shows five sectors. Which of the marked angles measures 2 radians?

$a = 60^\circ$

$b = \frac{s}{r} = \frac{2}{2} = 1$ rad.

$c = \frac{2\pi(1)}{1} = 2\pi$



$d = 120^\circ$

$e = \frac{s}{r}$

$= \frac{2}{1}$

$= 2$ rad.

A. a

B. b

C. c

D. d

E. e

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49. In the figure, *ABCDEFGH* is a rectangular block. Find the inclination of *EM* to the plane *ABCD* correct to the nearest degree.

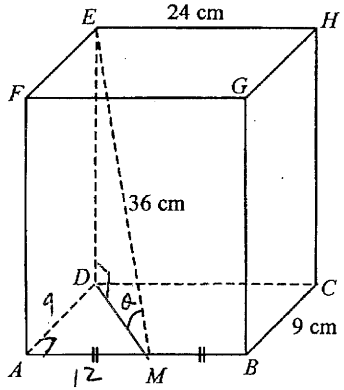
$DM^2 = 9^2 + 12^2$

$DM = 15.$

$\cos\theta = \frac{15}{36}$

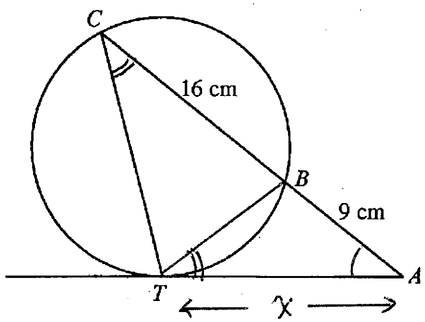
$\theta = 65.3^\circ$

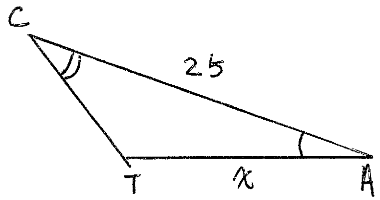
A. 23°
B. 25°
C. 65°
D. 71°
E. 75°

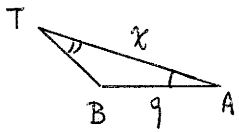


50. In the figure, *AT* is tangent to the circle at *T* and *ABC* is a straight line. Find *AT*.

A. 9 cm
B. 12 cm
C. 15 cm
D. 16 cm
E. 20 cm







$\triangle ATC \sim \triangle ABT$

$\frac{25}{x} = \frac{x}{9}$

$x^2 = 225$

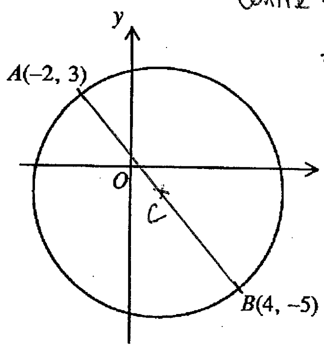
$\therefore x = 15.$

51. In the figure, find the equation of the circle with *AB* as a diameter.

centre $= \left(\frac{-2+4}{2}, \frac{3+(-5)}{2}\right)$

$= (1, -1)$

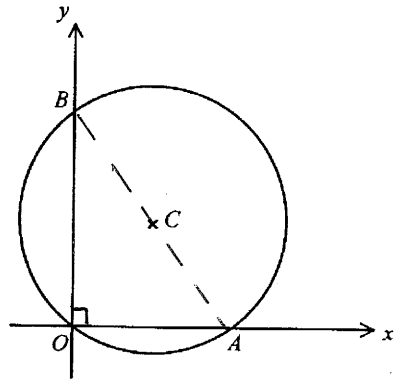
A. $x^2 + y^2 - 2x + 2y - 23 = 0$
B. $x^2 + y^2 - 2x + 2y - 3 = 0$
C. $x^2 + y^2 + 2x - 2y - 23 = 0$
D. $x^2 + y^2 + 2x - 2y - 3 = 0$
E. $x^2 + y^2 - 25 = 0$



52. The figure shows a circle centred at *C* and passing through *O*(0, 0), *A*(6, 0) and *B*(0, 8). Which of the following must be true?

I. *C* lies on the line $\frac{x}{6} + \frac{y}{8} = 1$.
II. The radius of the circle is 10.
III. *OC* is perpendicular to *AB*.

A. I only
B. II only
C. I and II only
D. I and III only
E. I, II and III



Since $\angle AOB = 90^\circ$, AB is a diameter.

centre $C = \left(\frac{6+0}{2}, \frac{0+8}{2}\right)$

$= (3, 4).$

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53. Two circles with equations $(x+1)^2+(y+1)^2=25$ and $(x-11)^2+(y-8)^2=100$ touch each other externally at a point P. Find the coordinates of P.

A. $(-3,-2)$

B. $(\frac{7}{5},\frac{4}{5})$

C. $(3,2)$

D. $(5,\frac{7}{2})$

E. $(7,5)$

54. In the figure, $ABCD$ is a rectangle. M is the midpoint of BC and AC intersects MD at N.
Area of ΔNCD : area of $ABMN=$

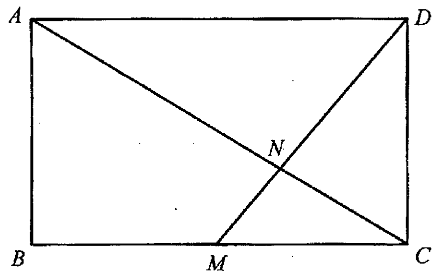
A. 1 : 2 .

B. 1 : 3 .

C. 2 : 3 .

D. 2 : 5 .

E. 4 : 7 .



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