ST. PAUL'S COLLEGE

F.4 Final Examination 2018-2019

Maths II

Multiple Choice Qns

Founded 1851

Suggested Solutions

Time allowed: 50 mins

Paper II

Answers:

1A	2B	3D	4C	5D
6A	7B	8A	9A	10C
11D	12D	13B	14C	15A
16B	17D	18C	19D	20B
21C	22B	23D	24A	25C
26B	27C	28A	29B	30C

A-7, B-8, C-8, D-7

Question 1:

Simplify $\dfrac{(a\cdot\sqrt{b})^{-2}}{(a^{-1}\cdot\sqrt[3]{b^2})^3}$.

A. $\dfrac{a}{b^3}$ B. $\dfrac{a^2}{b^3}$ C. $\dfrac{a}{b^{10}}$ D. $\dfrac{1}{a^5b^{10}}$

Solutions:

Ans.: A

- $\dfrac{(a\cdot\sqrt{b})^{-2}}{(a^{-1}\cdot\sqrt[3]{b^2})^3}$

$= \dfrac{a^{-2}\cdot b^{-1}}{a^{-3}\cdot b^{2}}$

$= \dfrac{a^{-2-(-3)}}{b^{2-(-1)}}$

$= \dfrac{a}{b^3}$

Question 2:

If $x = 5 - \dfrac{3}{y-4}$, then $y =$

A. $\dfrac{4x-17}{x-5}$ B. $\dfrac{4x-23}{x-5}$ C. $\dfrac{4x+17}{x+5}$ D. $\dfrac{4x+23}{x+5}$

Solutions:

Ans.: B

- $x = 5 - \dfrac{3}{y-4}$

$\dfrac{3}{y-4} = 5-x$

$\dfrac{y-4}{3} = \dfrac{1}{5-x}$

$y-4 = \dfrac{3}{5-x}$

$y = 4 + \dfrac{3}{5-x}$

$y = \dfrac{4(5-x)+3}{5-x}$

$y = \dfrac{23-4x}{5-x}$

$y = \dfrac{4x-23}{x-5}$

Question 3:

$$\frac{\frac{1}{x}-\frac{1}{y}}{\frac{y}{x}-\frac{x}{y}}(y-x)=$$

A. 0 B. 1 C. $\frac{1}{x+y}$ D. $-\frac{x-y}{x+y}$

Solutions:

Ans.: D

- $\frac{\frac{1}{x}-\frac{1}{y}}{\frac{y}{x}-\frac{x}{y}}\cdot(y-x) = \frac{\frac{y-x}{xy}}{\frac{y^2-x^2}{xy}}\cdot(y-x)$

  $= \frac{(y-x)}{(y-x)(y+x)}\cdot(y-x) = -\frac{x-y}{x+y}$

Question 4:

The L.C.M. of a^2+3a+2, a^2+4a+4 and a^3+8 is

A. $a+2$ B. $(a+1)(a+2)^3$

C. $(a+1)(a+2)^2(a^2-2a+4)$ D. $(a+1)(a+2)^2(a^2+2a+4)$

Solutions:

Ans.: C

- $a^2+3a+2 = (a+1)(a+2)$
- $a^2+4a+4 = (a+2)^2$
- $a^3+8 = (a+2)(a^2-2a+4)$
- **L.C.M.** $= (a+1)(a+2)^2(a^2-2a+4)$
- H.C.F. $= (a+2)$

Question 5:

If $\frac{A}{x+1}+\frac{B}{x-1}\equiv\frac{1-5x}{x^2-1}$, then $A=$

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

Solutions:

Ans.: D

- $\frac{A(x-1)+B(x+1)}{(x+1)(x-1)} = \frac{1-5x}{x^2-1}$
- $A+B = -5 \quad \ldots(\mathbf{1})$
- $-A+B = 1 \quad \ldots(\mathbf{2})$

($\mathbf{1}$)–($\mathbf{2}$) : $2A = -6$

$A = -3$

Alternatively,

$A(x-1)+B(x+1)\equiv 1-5x$

Put $x=-1$,

$A(-1-1)+B(0)\equiv 1-5(-1)$

$A=-3$

Question 6:

Let $f(x)=2x^3+ax^2+bx-3$. If $f\left(\frac{1}{2}\right)=0$ and $f(-1)=0$, then $f(x)$ =

A. $(x+1)(2x-1)(x+3)$ B. $(x+1)(2x-1)(x-3)$

C. $(x-1)(2x+1)(x-3)$ D. $(x-1)(2x+1)(x+3)$

Solutions:

Ans.: A

Method 1

- $f(\frac{1}{2}) = 0$ means $(2x-1)$ is a factor of $f(x)$.
- $f(-1) = 0$ means $(x+1)$ is a factor of $f(x)$.

so $f(x) = 2x^3 + 7x^2 + 2x - 3$

$= (x+1)(Ax+B)(x+3)$

By comparing the coefficient of x^3 : $A = 2$

By comparing the constant term : $B = -1$

so $f(x) = 2x^3 + 7x^2 + 2x - 3$

$= (x+1)(2x-1)(x+3)$

Method 2

- $f(\frac{1}{2}) = 0$

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

- $a + 2b = 11$ . . . (**1**)

- $f(-1) = 0$

$2(-1)^3 + a(-1)^2 + b(-1) - 3 = 0$

- $a - b = 5$ . . . (**2**)

(**1**)–(**2**) : $3b = 6$

$b = 2$

$a = 7$

- $f(x)$

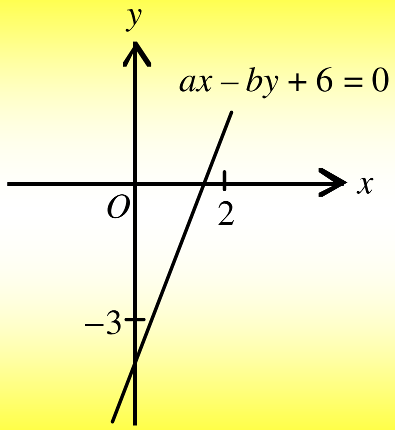
$= 2x^3 + 7x^2 + 2x - 3 = (x+1)(2x^2+5x-3) = (x+1)(2x-1)(x+3)$

Question 7:

The figure shows the graph of the straight line $ax - by + 6 = 0$.
Which of the following are true ?

(I) $a < b$
(II) $a > -3$
(III) $b > -2$

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



Solutions:

Ans.: B

- The line **L** : $ax - by + 6 = 0$
- Slope of line **L** $= \frac{a}{b} > \frac{2}{3}$ [I is **true**]
  $a < \frac{2}{3}b < b$
- x-intercept of **L** $= -\frac{6}{a} < 2$
  $-6 > 2a$ [since $a<0$]
  $-3 > a$ [II is **NOT true**]
- y-intercept of **L** $= \frac{6}{b} < -3$
  $6 > -3b$ [since $b<0$]
  $-2 < b$ [III is **true**]

Alternatively,
Taking x-intercept = 1 and y-intercept = –4,

Equation of the line is	$y = 4x - 4$
Multiplying by 1.5, equation becomes	$1.5y = 6x - 6$
Rearranging	$-6x + 1.5y + 6 = 0$
Comparing with	$ax - by + 6 = 0$
gives	$a = -6, b = -1.5$
	$a < b$, $a < -3$ and $b > -2$
	I, III are correct, II is not.

Question 8:

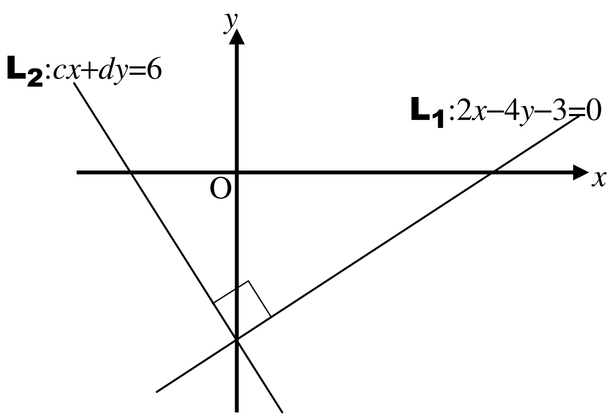
If the straight lines $cx + dy = 6$ and $2x - 4y - 3 = 0$ are perpendicular to each other and intersect at a point on the y-axis, then $c =$

A. –16 B. –4 C. 4 D. 16

Solutions:

Ans.: A

- For $L_1 \perp L_2$, $(-\frac{c}{d})(-\frac{2}{-4}) = -1$,
  $c = 2d$
- For L_1 : $x=0$, $y = -\frac{3}{4}$,
- For L_2 : $c(0) + d(-\frac{3}{4}) = 6$,
  $d = -8$
  $c = 2d = -16$



Question 9:

If $\alpha \neq \beta$ and $\begin{cases} 2\alpha^2 + b\alpha - c = 0 \\ 2\beta^2 + b\beta - c = 0 \end{cases}$, then $\alpha^2 + \alpha\beta + \beta^2 =$

A. $\frac{b^2+2c}{4}$ B. $\frac{b^2-2c}{4}$ C. $\frac{c^2-2b}{4}$ D. b^2-c

Solutions:

Ans.: A

- α, β are roots of the quadratic equation $2x^2+bx-c=0$.

$\alpha+\beta = -\frac{b}{2}$

$\alpha\times\beta = -\frac{c}{2}$

- $\alpha^2+\beta\alpha+\beta^2 = (\alpha+\beta)^2 - \alpha\times\beta$

$= (-\frac{b}{2})^2 - (-\frac{c}{2})$

$= \frac{b^2}{4} + \frac{c}{2}$

$= \frac{b^2+2c}{4}$

Question 10:

Let $f(x) = 4x - kx^2 - 3$. If the graph of $y + k = f(x)$ does not cut the x-axis.
Which of the following values is a possible value/are possible values of k ?

(I) -5
(II) 1
(III) 3

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

Solutions:

Ans.: C

- $y = f(x)-k$

$= -kx^2+4x-(k+3)$ has NO x-intercept

- $\Delta = (4)^2-4(-k)[-(k+3)] < 0$

$-k^2-3k+4 < 0$

- **Check with calculator :**
- $-(-5)^2-3(-5)+4 < 0$ [I is **true**]
- $-(1)^2-3(1)+4 = 0$ [II is **NOT true**]
- $-(3)^2-3(3)+4 < 0$ [III is **true**]

Question 11:

Which of the following statements about the graph of $y = (2 - x)(x - 4) - 8$ is true ?

A. The graph cuts the x-axis at two distinct points.
B. The graph opens upwards.
C. The y-intercept of the graph is –8 .
D. The coordinates of the vertex of the graph are (3, –7) .

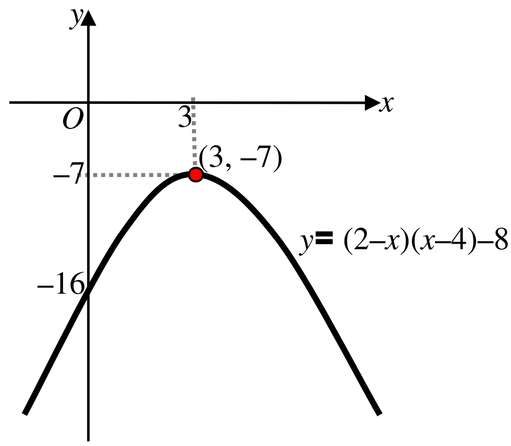
Solutions:

Ans.: D

A. On the x-axis, $y=0$,

$$0 = (2-x)(x-4)-8$$
$$0 = -x^2+6x-16$$
$$0 = x^2-6x+16,$$
$$\Delta = (-6)^2-4(1)(16) < 0, \quad \text{no solution}$$

NO x-intercept for the curve.



B. Coefficient of $x^2 = -1 < 0$,
the curve **opens downward**

C. On the y-axis, $x=0$,

$$y = (2-0)(0-4)-8$$
$$= -16$$

D.

$$y = (2-x)(x-4)-8$$
$$= -x^2+6x-16$$
$$= -[\,x^2-6x+3^2-3^2\,]-16$$
$$y = -[\,(x-3)^2-9]-16$$
$$= -(x-3)^2-7,$$

Vertex =

Alternatively,

For $y=ax^2+bx+c$;

Vertex = (h, k) where

$$h = \frac{-b}{2a} = \frac{-6}{2(-1)} = 3$$

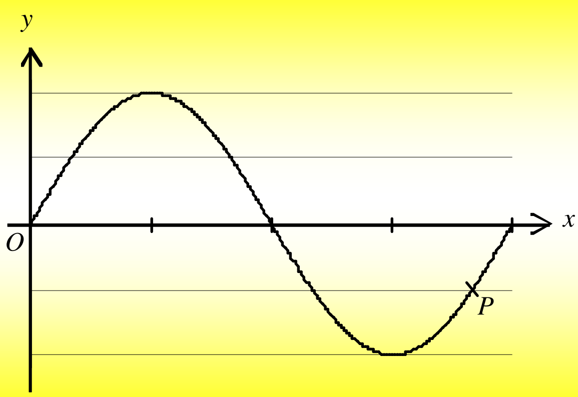
$$k = -3^2 + 6(3) - 16 = -7$$

so Vertex = (3, –7)

Question 12:

The figure shows the graph of $y = \sin(x°)$. Which of the following is most probably the x-coordinate of point P ?

A. 135
B. 150
C. 315
D. 330



Solutions:

Ans.: D

$y = \sin(330°) = -0.5$

Question 13:

For $0° \le x < 360°$, how many roots does the equation $3\sin^2 x = \cos x + 1$ have ?

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

Solutions:

Ans.: B

$$3(1-\cos^2 x) = \cos x + 1$$
$$3\cos^2 x + \cos x - 2 = 0$$
$$(3\cos x - 2)(\cos x + 1) = 0$$
$$\cos x = \frac{2}{3} \quad \text{or} \quad \cos x = -1$$
$$x = 48.2°, 312° \quad \text{or} \quad 180°$$

Question 14:

Let $f(x) = 3(kx^2 + 1)$ and $g(x) = 27x^3 + 18x - 5$. If both expressions leave the same remainder when divided by $3x - 2$, then $k =$

A. -21 B. $\frac{-9}{4}$ C. 9 D. $\frac{21}{2}$

Solutions:

Ans.: C

$$f\left(\frac{2}{3}\right) = g\left(\frac{2}{3}\right)$$
$$3\left[k\left(\frac{2}{3}\right)^2 + 1\right] = 27\left(\frac{2}{3}\right)^3 + 18\left(\frac{2}{3}\right) - 5$$
$$k\left(\frac{4}{3}\right) + 3 = 8 + 12 - 5$$
$$k = 9$$

Question 15:

Let $f(x) = (x-1)(x-3)g(x) + (x-2)$, where $g(x)$ is a cubic polynomial. Which of the following are true ?

(I) The remainder of $f(x) \div g(x)$ is $x - 2$.

(II) The remainder of $f(x) \div (x-1)(x-3)$ is $x - 2$.

(III) The remainder of $f(x) \div (x-1)$ is $x - 2$.

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

Solutions:

Ans.: A

Dividend = **Divisor**×**Quotient** + **Remainder**

(I) The **divisor** is $g(x)$, the remainder can be a linear polynomial.

(II) The **divisor** is $(x-1)(x-3)$, the remainder is a linear polynomial.

(III) The **Remainder** is $f(1) = 0 + (1-2) = -1$ is a constant.

Question 16:

Given that $\frac{a}{5}=\frac{b}{3}=\frac{c}{2}$ and $x:y:z=2^a:3^b:6^c$. Arrange x, y and z in ascending order.

A. $x<y<z$ B. $y<x<z$ C. $y<z<x$ D. $z<y<x$

Solutions:

Ans.: B

- Let $a=5k$, $b=3k$, $c=2k$,
- $x:y:z = 2^{5k}:3^{3k}:6^{2k} = 32^k:27^k:36^k$

Question 17:

Given that $\tan\theta=\frac{-3}{4}$ and θ lies in the second quadrant. Which of the following quadratic equations has roots $\sin\theta$ and $-2\cos\theta$?

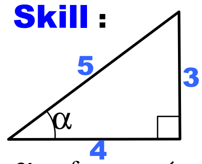
A. $x^2-11x+24=0$ B. $x^2+11x+24=0$

C. $25x^2+55x+24=0$ D. $25x^2-55x+24=0$

Solutions:

Ans.: D

Skill :



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- $\tan\theta=-\frac{3}{4}$, θ lies in the **second quadrant** ; $\sin\theta=\frac{3}{5}$, $\cos\theta=-\frac{4}{5}$
- **Sum** of roots $=\frac{3}{5}+\frac{8}{5}=\frac{11}{5}$; **Product** of roots $=\frac{3}{5}\times\frac{8}{5}=\frac{24}{25}$,
- **The required equation :** $x^2-(\text{Sum of roots})x+(\text{Product of roots})=0$

or $x^2-(\frac{11}{5})x+(\frac{24}{25})=0$ **or** $25x^2-55x+24=0$

Question 18:

$$\frac{1}{\cos(360^\circ-\theta)}+\frac{\sin(180^\circ-\theta)}{\tan(270^\circ+\theta)}=$$

A. 0 B. $-\cos\theta$ C. $\cos\theta$ D. $\frac{\sin^2\theta}{\cos\theta}$

Solutions:

Ans.: C

- $$\frac{1}{\cos(360^\circ-\theta)}+\frac{\sin(180^\circ-\theta)}{\tan(270^\circ+\theta)} = \frac{1}{\cos(\theta)}+\frac{\sin(\theta)}{-\frac{1}{\tan(\theta)}}$$

$$= \frac{1}{\cos(\theta)}+\sin(\theta)\div[-\frac{1}{\tan(\theta)}]$$

$$= \frac{1}{\cos(\theta)}+\sin(\theta)\times[-\frac{\sin(\theta)}{\cos(\theta)}]$$

$$= \frac{1-\sin^2(\theta)}{\cos(\theta)} = \frac{\cos^2(\theta)}{\cos(\theta)} = \cos(\theta)$$

Question 19:

If a is a real number, then the real part of $\frac{3-i^3}{a-i}+i^6$ is

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

Solutions:

Ans.: D

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

$= (\frac{3+i}{a-i})(\frac{a+i}{a+i})-1$

$= \frac{3a+ai+3i+i^2}{a^2-i^2}-1$

$= \frac{3a+ai+3i-1-a^2-1}{a^2+1}$

$= \frac{(-a^2+3a-2)+(a+3)i}{a^2+1}$

$= (\frac{-a^2+3a-2}{a^2+1})+(\frac{a+3}{a^2+1})i$

- The real part of $\frac{3-i^3}{a-i}+i^6 = \frac{-a^2+3a-2}{a^2+1}$

Question 20:

A sum of $100 000 is deposited at an interest rate of 6% per annum for n years compounded monthly. The interest earned correct to the nearest dollar is $12 716.

Find n correct to the nearest $\frac{1}{12}$.

A. $1\frac{8}{12}$ B. 2 C. $2\frac{1}{12}$ D. $2\frac{2}{12}$

Solutions:

Ans.: B

- $100000[\,(1+\frac{0.06}{12})^{12n}-1\,] = 12716$

$(1.005)^{12n} = 1.12716$

$\log[\,(1.005)^{12n}\,] = \log(1.12716)$

$12n = \frac{\log(1.12716)}{\log(1.005)}$

$12n = 24.00004$

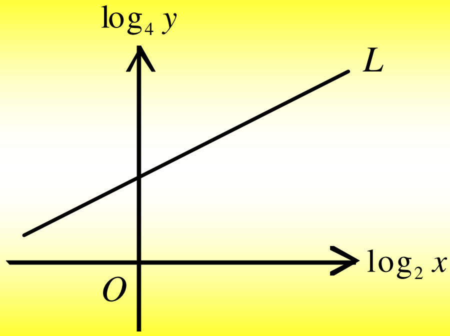
$n = 2$

Question 21:

In the figure, the straight line L shows the relation between $\log_2 x$ and $\log_4 y$. It is given that L passes through the points (4, 4) and (8, 7). If $y = kx^a$, then $k =$

A. $\frac{3}{2}$ B. 1

C. 4   D. 8



Solutions:

Ans.: C

- Slope of the straight line L = $\frac{7-4}{8-4}$ = $\frac{3}{4}$
- L passes through (0, c) :

$\frac{c-4}{0-4} = \frac{3}{4}$, $c = 1$, the y-intercept

Method 1

Equation of L :

$\log_4 y = \frac{3}{4}(\log_2 x) + 1$ [In the form Y = mX + c]

$\frac{\log(y)}{\log(4)} = (\frac{3}{4})\frac{\log(x)}{\log(2)} + 1$

$\frac{\log(y)}{2\log(2)} = (\frac{3}{4})\frac{\log(x)}{\log(2)} + 1$

$2[\log(y)] = 3[\log(x)] + 4[\log(2)]$

$\log(y^2) = \log(x^3) + \log(2^4)$

$\log(y^2) = \log[(2^4)(x^3)]$

$y^2 = (2^4)(x^3)$

- $y = (2^2)(x^{1.5})$

$k = 4$, $a = 1.5$

Method 2

$y = k(x^a)$

$\log_4(y) = a[\log_4(x)] + \log_4(k)$

$\log_4(y) = (a)\frac{\log(x)}{\log(4)} + \log_4(k)$

$\log_4(y) = (a)\frac{\log(x)}{2\log(2)} + \log_4(k)$

$\log_4(y) = (\frac{a}{2})\log_2(x) + \log_4(k)$

- $\log_4(k) = 1$ = the y-intercept

$k = 4^1$, $a = 1.5$

Question 22:

Let a and b be positive constants. Denote the graph of $y = \log_a x + b$ by G.
The x-intercept of G is 4 and G passes through the point (16, 2), then

A. $x = 2^{8-2y}$ B. $x = 2^{y+2}$ C. $x = 2^y + 2$ D. $x = 2^y + 4$

Solutions:

Ans.: B

- $y = \log_a(x) + b$
- $0 = \log_a(4) + b$ ....**(1)** [G passes through (4, 0)]
- $2 = \log_a(16) + b$ ....**(2)** [G passes through (16, 2)]
- **(2)-(1):**

$2 = \log_a(\frac{16}{4})$

$a^2 = 4$

$a = 2,$

$b = -2$

- $y = \log_2(x) - 2$

$y+2 = \log_2(x)$

$2^{y+2} = x$

Question 23:

Let O be the origin. The coordinates of the points P and Q are (30, 10) and (–10, –30) respectively. The x-coordinate of the circumcentre of ΔOPQ =

A. –10 B. 0 C. 10 D. 25

Solutions:

Ans.: D

- $M = (\frac{30-10}{2}, \frac{10-30}{2}) = (10, -10)$
- Equation of $\mathbf{L_1}$:

$y = -x$

- $N = (\frac{30+0}{2}, \frac{10+0}{2}) = (15, 5)$
- Slope of $OP = \frac{10-0}{30-0} = \frac{1}{3}$
- Equation of $\mathbf{L_2}$:

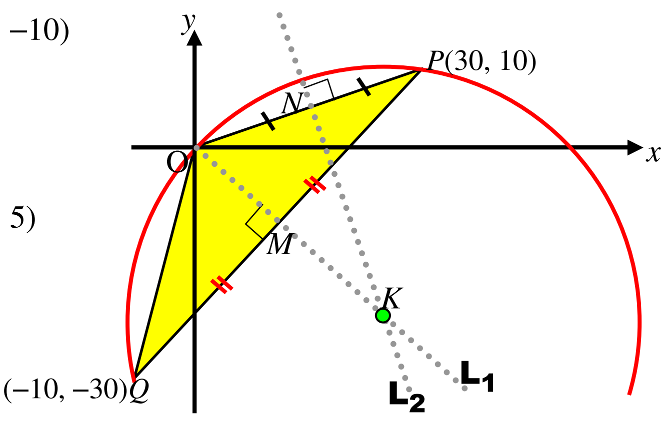
$y-5 = (-3)(x-15)$

$y = -3x + 50$

- Solving equations of $\mathbf{L_1}$ and $\mathbf{L_2}$:

$x = 25$

$y = -25,$ $K = (25, -25)$



Alternatively,
Sketch the graph, see which of the options fits.

Question 24:

Find the maximum value of $\cos^2 x - 4\cos x + 7$ for $0° \le x \le 360°$

A. 12 B. 8 C. 7 D. 4

Solutions:

Ans.: A

- $(\cos x)^2 - 4(\cos x) + 7$
- $= (\cos x)^2 - 4(\cos x) + 4 + \mathbf{3}$
- $= (\cos x - 2)^2 + \mathbf{3}$

- **Maximum** of $(\cos x)^2 - 4(\cos x) + 7 = (-1 - 2)^2 + \mathbf{3} = \mathbf{12}$

Question 25:

In the figure, ΔABC cuts the circle at D, E, F and G. M and N are mid-points of DE and FG respectively and $ME = NF$. O is the centre of the circle, $\angle ABC = 66°$ and $\angle ACB = 72°$.

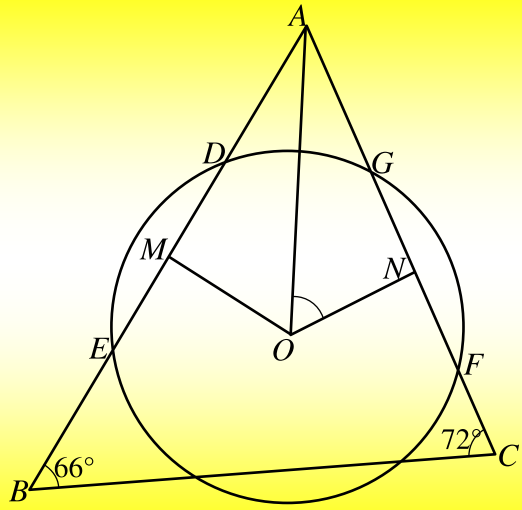
$\angle AON =$

A. 84°

B. 72°

C. 69°

D. 66°



Solutions:

Ans.: C

$\angle ONA$	=	90°	(*Line joining centre to the mid-pt. of chord ⊥ chord*)
$\angle OMA$	=	90°	(*Line joining centre to the mid-pt. of chord ⊥ chord*)
ME	=	NF	(*Given*)
$2 \times ME$	=	$2 \times NF$	
DE	=	GF	(M, N are given to be mid-points)
OM	=	ON	(*Equal chords, equidistant from centre*)
OA	=	OA	(*Common*)
ΔOMA	≅	ΔONA	(**R.H.S.**)

- $\angle OAM = \angle OAN$ (*corr.* ∠s, ≅ Δs)
- $\angle OAM + \angle OAN + 72° + 66° = 180°$ (∠ *sum of* Δ)
- $\angle OAN = 21°$

- $\angle AON + 90° + 21° = 180°$ (∠ *sum of* Δ)
- $\angle AON = 69°$

Question 26:

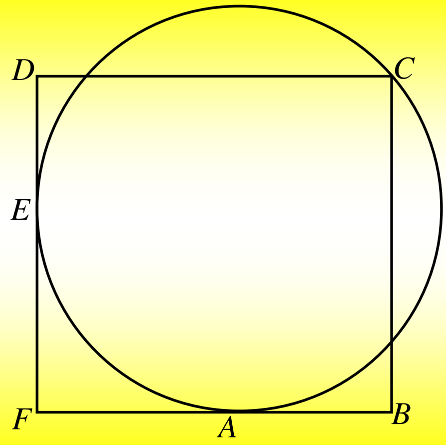
In the figure, rectangle *BCDF* touches the circle at *A* and *E*, *C* is a point on the circumference, *FB* = 9, *FD* = 8, the radius of the circle =

A. $\frac{72}{17}$

B. 5

C. 6

D. cannot be determined



Solutions:

Ans.: B

- Let the radius be r .

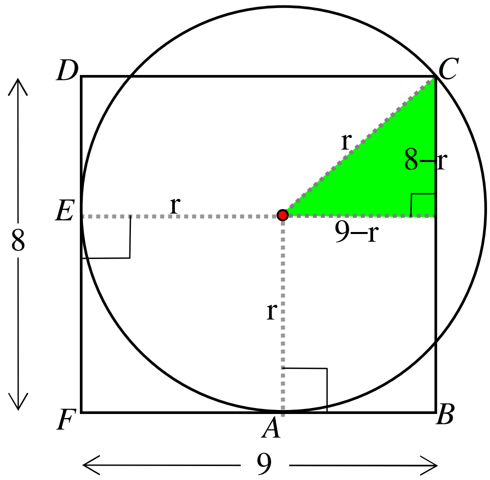
$(8-r)^2 + (9-r)^2 = r^2$

$64-16r+r^2 + 81-18r+r^2 = r^2$

$r^2 - 34r + 145 = 0$

$(r-5)(r-29) = 0$

$r = 5$ or $r = 29$ (**rejected**)



Question 27:

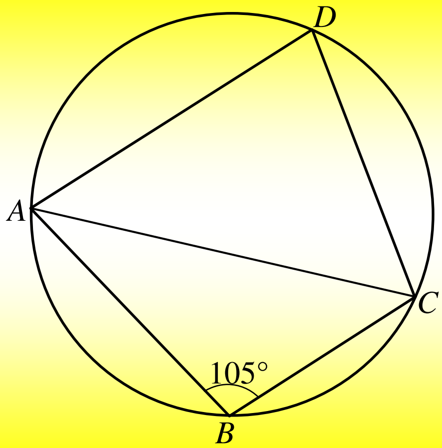
In the figure, *BD* is a diameter, $\overset{\frown}{AB} : \overset{\frown}{BC} = 3 : 2$ and ∠*ABC* = 105°. ∠*DAC*=

A. 42°

B. 54°

C. 60°

D. 63°



Solutions:

Ans.: C

- Let ∠*ACB*=3*k* , ∠*BAC*=2*k*

$3k + 2k + 105° = 180°$ (∠ *sum of* Δ)

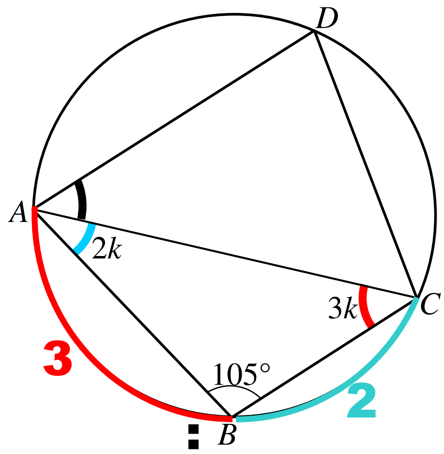
$k = 15°$

- ∠*DAB* = 90° (∠ *in semi-circle*)

∠*DAC*+∠*BAC* = 90°

- ∠*DAC* = 90°−2(15°)

= 60°



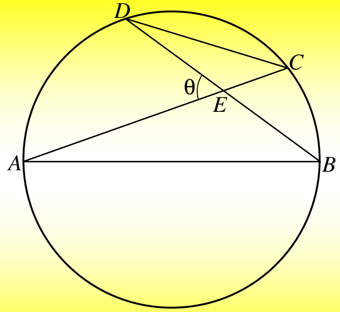
Question 28:

In the figure, AB is a diameter of the circle $ABCD$.
It is given that AC and BD intersect at E and $\angle AED = \theta$.
Which of the following are true ?

(I) $\Delta DCE \sim \Delta ABE$.

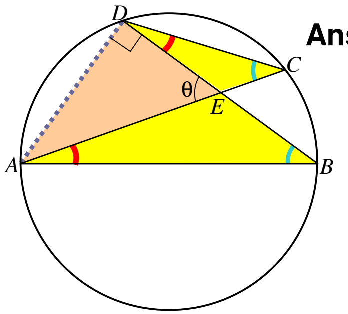
(II) $\frac{CD}{AB} = \cos\theta$.

(III) $\angle ABD = \frac{\theta}{2}$.



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

Solutions:



Ans.: A

- (I) is **true** (**A.A.A.**)
- (II) is **true** since

$\cos\theta = \frac{DE}{AE}$ [In ΔADE]

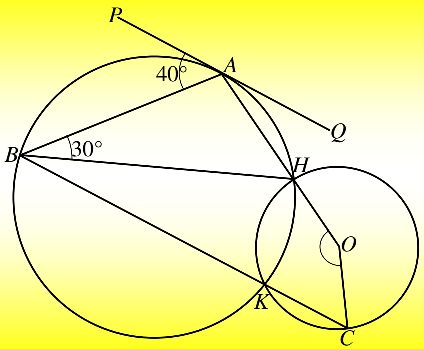
$= \frac{CD}{AB}$ [*corr. sides,* $\sim\Delta s$]

- (III) is **NOT true** since
  E is not given to be the centre of the circle

Question 29:

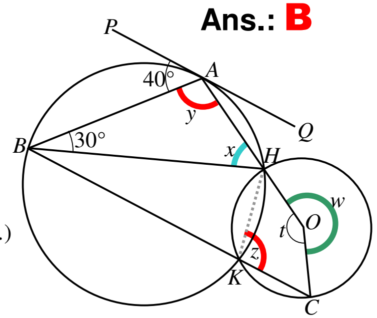
In the figure, O is the centre of the smaller circle, the two circles intersect at H and K, OHA and CKB are straight lines. PQ touches the larger circle at A.
$\angle PAB = 40°$ and $\angle ABH = 30°$.
$\angle COH =$

A. 20°
B. 140°
C. 110°
D. 70°



Solutions:

Ans.: B



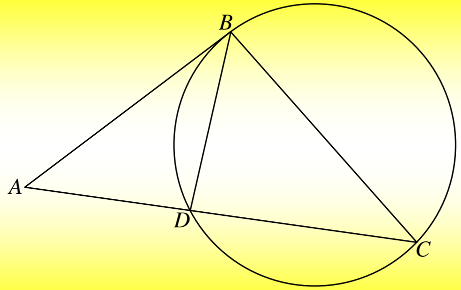
- $x = 40°$ (*∠s in alternate segment*)
- $y = 180° - 40° - 30°$
  $= 110°$ (*∠ sum of Δ*)
- $z = y$ (*ext. ∠, cyclic quad.*)
  $= 110°$
- $w = 2 \times z$ (*∠ at centre=2×∠ at the circum.*)
  $= 220°$
- $t = 360° - 220°$ (*∠s at a pt.*)
  $= 140°$

Question 30:

In the figure, AB is the tangent to the circle at B and ADC is a straight line.

If $AC : AB = 3 : 2$, then
the area of ΔABD : the area of ΔBCD =

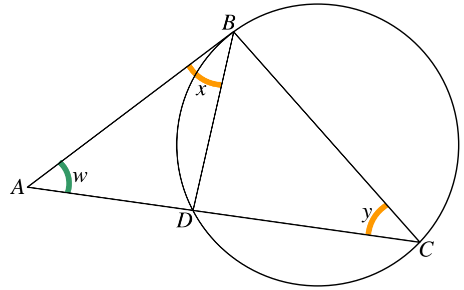
A. 2 : 3
B. 3 : 5
C. 4 : 5
D. 4 : 9



Solutions:

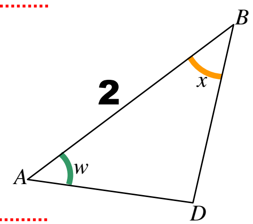
Ans.: C

- $x = y$ (*∠s in alternate segment*)
- $\angle BAC = \angle DAB$ (*common*)
  $= w$
- $\Delta ABC \sim \Delta ADB$ (**A.A.A.**)



- $AC : AB = 3 : 2$ (*Given*)
  $\frac{AC}{AB} = \frac{3}{2}$

- $\frac{Area\ of\ \Delta ABC}{Area\ of\ \Delta ADB}$
  $= (\frac{3}{2})^2$
  $= \frac{9}{4}$



- $\frac{Area\ of\ \Delta BCD}{Area\ of\ \Delta ADB}$
  $= \frac{9-4}{4}$
  $= \frac{5}{4}$

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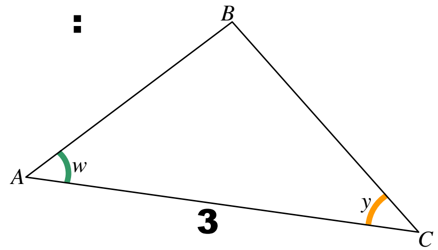

- $\frac{Area\ of\ \Delta ADB}{Area\ of\ \Delta BCD}$
  $= \frac{4}{5}$

- *Area of* ΔABD **:** *Area of* ΔBCD
  $= 4 : 5$