

MATHEMATICS
MARKING GUIDELINES

1.	D
2.	D
3.	B
4.	B
5.	A
6.	B
7.	A
8.	A
9.	C
10.	C
11.	D
12.	C
13.	B
14.	C
15.	D
16.	A
17.	B
18.	A
19.	C
20.	A

21.	C
22.	D
23.	B
24.	B
25.	C
26.	B
27.	C
28.	C
29.	B
30.	C
31.	B
32.	B
33.	C
34.	D
35.	D
36.	C
37.	C
38.	B
39.	D
40.	A

QUESTION 1**Answer: (D)**

$$\begin{aligned}T_n &= a + (n-1)d \\ &= 20 + (n-1)(-4) \\ &= -4n + 24\end{aligned}$$

QUESTION 2**Answer: (D)**

$$\frac{7-10}{5-(-4)} = \frac{-3}{9} = -\frac{1}{3}$$

QUESTION 3**Answer: (B)****QUESTION 4****Answer: (B)****QUESTION 5****Answer: (A)**

$$\begin{aligned}&= \frac{x-(x+h)}{x(x+h)} \\ &= \frac{-h}{x(x+h)}\end{aligned}$$

QUESTION 6**Answer: (B)****QUESTION 7****Answer: (A)**

QUESTION 8**Answer: (A)**

$$\left(\frac{a+5a}{2}; \frac{a-7a}{2} \right) = (3a; -3b)$$

QUESTION 9**Answer: (C)**

$$0,8 + 0,2 - P(A \cap B) = 0,9$$

$$1 - P(A \cap B) = 0,9$$

$$P(A \cap B) = 0,1$$

$$P(A \cap B)' = 1 - 0,1 \\ = 0,9$$

QUESTION 10**Answer: (C)**

- (A) Mean reduces
 (B) Mean unchanged
 (C) Mean increases, standard deviation reduces because value is within range of first three tests
 (D) Mean increases, standard deviation increases because value is outside range of first three tests

QUESTION 11**Answer: (D)**

$$2\sqrt{x+5} = \sqrt{-16x}$$

$$4(x+5) = -16x$$

$$4x + 20 = -16x$$

$$20x = -20$$

$$x = -1$$

QUESTION 12**Answer: (C)**

$$\hat{C}BD = 55^\circ$$

tan chord thm

$$\hat{D}CB = 80^\circ$$

∠ sum of Δ

$$\hat{B}AD = 100^\circ$$

opp ∠s of cyclic quad

QUESTION 13

Answer: (B)

$$\begin{aligned} \sqrt{a\sqrt{a\sqrt{a}}} &= a^x \\ &= \left(a \left(a \left(a^{\frac{1}{2}} \right)^{\frac{1}{2}} \right)^{\frac{1}{2}} \right)^{\frac{1}{2}} \\ &= \left(a \left(a^{\frac{3}{2}} \right)^{\frac{1}{2}} \right)^{\frac{1}{2}} \\ &= \left(a \cdot a^{\frac{3}{4}} \right)^{\frac{1}{2}} \\ &= \left(a^{\frac{7}{4}} \right)^{\frac{1}{2}} \\ &= a^{\frac{7}{8}} \end{aligned}$$

QUESTION 14

Answer: (C)

$$\begin{aligned} 3x + 5y - 7 &= 0 & 4kx - 2y - 10 &= 0 \\ y &= -\frac{3}{5}x + \frac{7}{5} & y &= 2kx - 5 \\ 2k &= -\frac{3}{5} \\ k &= -\frac{3}{10} \end{aligned}$$

QUESTION 15

Answer: (D)

	2	3	5	6
1	3	4	6	7
3	5	6	8	9
4	6	7	9	10

$$\begin{aligned} &= \frac{9}{12} \\ &= \frac{3}{4} \end{aligned}$$

QUESTION 16**Answer: (A)**

$$\begin{aligned}
 &= \frac{-\cos \theta - \cos \theta}{-\sin \theta - \sin \theta} \\
 &= \frac{-2 \cos \theta}{-2 \sin \theta} \\
 &= \frac{1}{\tan \theta}
 \end{aligned}$$

QUESTION 17**Answer: (B)****QUESTION 18****Answer: (A)**

$$\begin{aligned}
 OC &= 5 && \text{radius} \\
 AO &= 13 \\
 AB &= 12 && \text{Pythag triple} \\
 \text{Area} &= \frac{1}{2} \times 12 \times 5 = 30
 \end{aligned}$$

QUESTION 19**Answer: (C)****QUESTION 20****Answer: (A)**

$$\begin{aligned}
 \text{Sleep: } 456666677778899 &\Rightarrow \text{median} = 7 \\
 \text{Study: } 11122223334455 &\Rightarrow \text{median} = 2 \\
 7 - 2 &= 5
 \end{aligned}$$

QUESTION 21**Answer: (C)**

$$\begin{aligned}
 ax + ay &= y^2 - x^2 \\
 a(x + y) &= (x + y)(x - y) \\
 a &= y - x
 \end{aligned}$$

QUESTION 22**Answer: (D)**

$$\begin{aligned} \widehat{BCA} &= 50^\circ && \text{ext } \angle \text{ of } \Delta \\ m_{BC} &= \tan(180^\circ - 50^\circ) && \angle \text{s on a str line} \\ &= \tan 130^\circ \\ &= -\tan 50^\circ \\ m_{AB} &= \frac{1}{\tan 50^\circ} && \perp \text{ lines} \end{aligned}$$

QUESTION 23**Answer: (B)**

$$\begin{aligned} 4x + 2 - 2x &= 12 - (4x + 2) \\ 2x + 2 &= -4x + 10 \\ 6x &= 8 \\ x &= \frac{4}{3} \end{aligned}$$

QUESTION 24**Answer: (B)**

$$= 1 + \frac{\sqrt{3}}{2} + \frac{1}{2} + 0 - \frac{1}{2} - \frac{\sqrt{3}}{2} = 1$$

$$A = \cos(450^\circ - 360^\circ) = \cos 90^\circ = 0$$

$$B = \sqrt{3} \times \frac{1}{\sqrt{3}} = 1$$

$$C = \sqrt{3} \times \frac{1}{2} = \frac{\sqrt{3}}{2}$$

$$D = \sqrt{3} \times \frac{\sqrt{3}}{2} = \frac{3}{2}$$

QUESTION 25**Answer: (C)**

$$f(x) = x^2 - 6x + 9 + 2 - 9$$

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

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

$$g(x) = (x - 5)^2 - 2$$

QUESTION 26

Answer: (B)

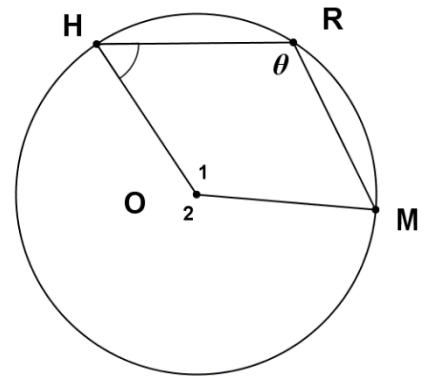
QUESTION 27

Answer: (C)

QUESTION 28

Answer: (C)

$\hat{O}_1 = \theta$ *opp \angle s of rhom*
 $\hat{O}_2 = 2\theta$ *\angle at centre = $2 \times \angle$ at circum*
 $\hat{O}_1 + \hat{O}_2 = 360^\circ$ *\angle s around a point*
 $3\theta = 360^\circ$
 $\theta = 120^\circ$
 $H = 60^\circ$ *co-int \angle s, $HR \square OM$*



QUESTION 29

Answer: (B)

$f(4) = f(3) + 3(4)$
 $f(4) = 4 + 12$
 $f(4) = 16$

 $f(5) = f(4) + 3(5)$
 $f(5) = 16 + 3(5)$
 $f(5) = 31$

QUESTION 30

Answer: (C)

$b = 2a + 1$
 $d = \sqrt{(a-4)^2 + ((2a+1)-1)^2}$
 $20 = a^2 - 8a + 16 + 4a^2$
 $0 = 5a^2 - 8a - 4$
 $0 = (5a + 2)(a - 2)$
 $a = 2$ or $a = -\frac{2}{5}$

QUESTION 31

Answer: (B)

$$\begin{aligned} & \frac{(5^{(x-1)})^5}{4^{-\sqrt{y}}} \\ &= \frac{(5^x \cdot 5^{-1})^5}{(2^2)^{-\sqrt{y}}} \\ &= \frac{(5^{5x} \cdot 5^{-5})}{(2^{\sqrt{y}})^{-2}} \\ &= \frac{(40 \cdot 5^{-5})}{(25)^{-2}} \\ &= \frac{(40 \cdot 5^{-5})}{(5^2)^{-2}} \\ &= \frac{40}{5} \\ &= 8 \end{aligned}$$

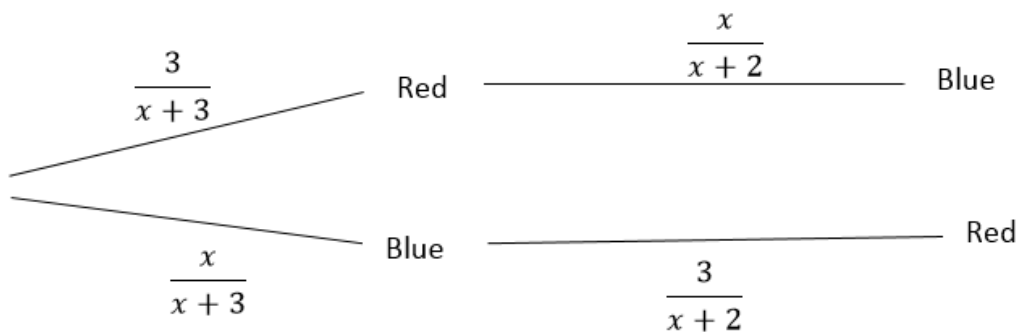
QUESTION 32

Answer: (B)

$$\frac{\text{Area } \triangle ABD}{\text{Area } \triangle BCD} = \frac{\frac{1}{2}(8)(12)\sin 114^\circ}{\frac{1}{2}(15)(16)\sin 66^\circ} = \frac{2}{5} \quad \text{sine rule, opp } \angle\text{s of cycl quad, } \sin \theta = \sin(180^\circ - \theta)$$

QUESTION 33

Answer: (C)



QUESTION 34

Answer: (D)

$$\sin x \tan x - \sqrt{3} \sin x = 0$$

$$\sin x (\tan x - \sqrt{3}) = 0$$

$$\sin x = 0 \text{ or } \tan x = \sqrt{3}$$

$$x = k.180^\circ \text{ or } x = 60^\circ + k.180^\circ \quad k \in \mathbb{Z}$$

QUESTION 35

Answer: (D)

$$\begin{aligned} g(x) - f(x) &= -x^2 - 8x - (-2x - 8) \\ &= -x^2 - 6x + 8 \end{aligned}$$

$$x\text{-coordinate of Turning Point: } x = \frac{-b}{2a} = \frac{-(-6)}{2(-1)} = -3$$

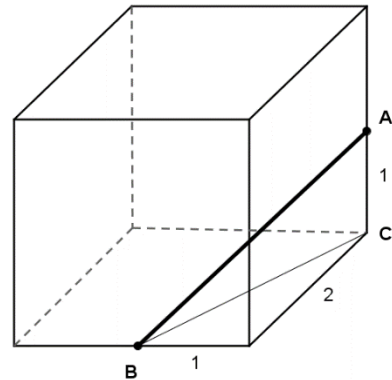
$$\begin{aligned} g(-3) - f(-3) &= -(-3)^2 - 6(-3) + 8 \\ &= -9 + 18 + 8 \\ &= 17 \end{aligned}$$

QUESTION 36

Answer: (C)

$$BC = \sqrt{2^2 + 1^2} = \sqrt{5} \quad (\text{Pythag})$$

$$AB = \sqrt{(\sqrt{5})^2 + 1^2} = \sqrt{6} \quad (\text{Pythag})$$



QUESTION 37

Answer: (C)

$$9^x - (x^{x+1})(4) + 27 = 0$$

$$(3^2)^x - (3^x)(3)(4) + 27 = 0$$

$$k^2 - 12k + 27 = 0$$

$$(k - 3)(k - 9) = 0$$

$$k = 3 \text{ or } k = 9$$

$$3^x = 3$$

$$\therefore x = 1$$

OR

$$3^x = 9$$

$$x = 2$$

QUESTION 38

Answer: (B)

$$\frac{\sin B}{b} = \frac{\sin A}{a} \Rightarrow \sin B = \frac{b \sin A}{a} \quad \text{sine rule}$$

$$\frac{2 \sin B}{\tan A} = \frac{2 \frac{b}{a} \sin A}{\frac{\sin A}{\cos A}}$$

$$= 2 \frac{b}{a} \cos A$$

$$= 2 \frac{b}{a} \left(\frac{b^2 + c^2 - a^2}{2bc} \right)$$

$$= \frac{b^2 + c^2 - a^2}{ac}$$

QUESTION 39

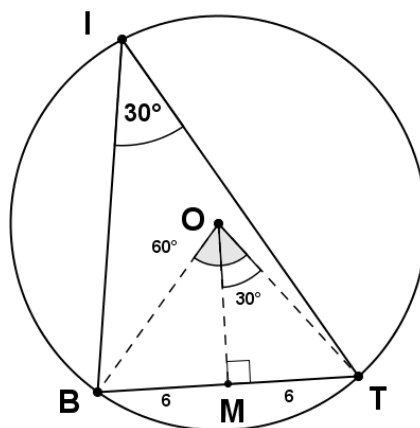
Answer: (D)

Construct radii OT and OB .
Drop a perpendicular from O to M on BT .

M is the midpoint of BT line from centre \perp to chord
 $\triangle OMB \cong \triangle OMT$ SAS
 $\therefore \hat{BOM} = \hat{TOM}$
 But $\hat{BOT} = 60^\circ$ \angle at centre = $2 \times \angle$ at circle
 $\therefore \hat{TOM} = 30^\circ$

$$\sin \hat{TOM} = \sin 30^\circ = \frac{1}{2} = \frac{6}{OT}$$

\therefore radius $OT = 12$
 \therefore diameter = 24



QUESTION 40

Answer: (A)

$\alpha\beta\epsilon\epsilon\epsilon\theta$ $\alpha\alpha\beta\beta\beta\beta\epsilon\epsilon\epsilon\epsilon\epsilon\epsilon\theta$ $\alpha\alpha\alpha\alpha\beta\beta\beta\beta\beta\beta\beta\beta\epsilon\epsilon\epsilon\epsilon\epsilon\epsilon\epsilon\epsilon\epsilon\theta$
 6 + 1 12 + 1 24 + 1

Pattern	Cumulative
6 + 1 = 7	7
12 + 1 = 13	7 + 13 = 20
24 + 1 = 25	20 + 25 = 45
48 + 1 = 49	45 + 49 = 94
96 + 1 = 97	94 + 97 = 191

195th position will be 4 places into the next patter i.e. α