GRADE 11 IeBT
2016

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)

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

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)

$C\hat{B}D=55°$	*tan chord thm*
$D\hat{C}B=80°$	$\angle$ *sum of* Δ
$B\hat{A}D=100°$	*opp* $\angle$*s of cyclic quad*

QUESTION 13

Answer: (B)

$$\sqrt{a\sqrt{a\sqrt{a}}} = a^x$$

$$= \left(a\left(a\left(a^{\frac{1}{2}} \right) \right)^{\frac{1}{2}} \right)^{\frac{1}{2}}$$

$$= \left(a\left(a^{\frac{3}{2}} \right)^{\frac{1}{2}} \right)^{\frac{1}{2}}$$

$$= \left(a.a^{\frac{3}{4}} \right)^{\frac{1}{2}}$$

$$= \left(a^{\frac{7}{4}} \right)^{\frac{1}{2}}$$

$$= a^{\frac{7}{8}}$$

QUESTION 14

Answer: (C)

$3x+5y-7=0$ $\qquad$ $4kx-2y-10=0$

$y=-\frac{3}{5}x+\frac{7}{5}$ $\qquad$ $y=2k\,x-5$

$$2k=-\frac{3}{5}$$

$$\boldsymbol{k}=-\frac{3}{10}$$

QUESTION 15

Answer: (D)

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

$$=\frac{9}{12}$$

$$=\frac{3}{4}$$

QUESTION 16

Answer: (A)

$$= \frac{-\cos\theta - \cos\theta}{-\sin\theta - \sin\theta}$$
$$= \frac{-2\cos\theta}{-2\sin\theta}$$
$$= \frac{1}{\tan\theta}$$

QUESTION 17

Answer: (B)

QUESTION 18

Answer: (A)

$OC = 5$ *radius*
$AO = 13$
$AB = 12$ *Pythag triple*
$Area = \frac{1}{2} \times 12 \times 5 = 30$

QUESTION 19

Answer: (C)

QUESTION 20

Answer: (A)

Sleep: $456666677778899 \Rightarrow median = 7$
Study: $111122223334455 \Rightarrow median = 2$
$7 - 2 = 5$

QUESTION 21

Answer: (C)

$ax + ay = y^2 - x^2$
$a(x + y) = (x + y)(x - y)$
$a = y - x$

QUESTION 22

Answer: (D)

$B\hat{C}A = 50°$ *ext* $\angle$ *of* Δ

$m_{BC} = \tan(180° - 50°)$ $\angle s$ *on a str line*

$= \tan 130°$

$= -\tan 50°$

$m_{AB} = \dfrac{1}{\tan 50°}$ $\perp$ *lines*

QUESTION 23

Answer: (B)

$4x + 2 - 2x = 12 - (4x + 2)$

$2x + 2 = -4x + 10$

$6x = 8$

$x = \dfrac{4}{3}$

QUESTION 24

Answer: (B)

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

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

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

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

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

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

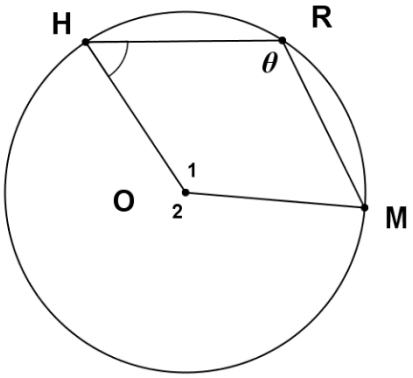
Answer: (B)

QUESTION 27

Answer: (C)

QUESTION 28

Answer: (C)



$\hat{O}_1 = \theta$ *opp ∠s of rhom*

$\hat{O}_2 = 2\theta$ *∠ at centre = 2 × ∠ at circum*

$\hat{O}_1 + \hat{O}_2 = 360°$ *∠s around a point*

$3\theta = 360°$

$\theta = 120°$

$H = 60°$ *co – int ∠s, HR ∥ 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)

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

QUESTION 31

Answer: (B)

$$\frac{\left(5^{(x-1)}\right)^5}{4^{-\sqrt{y}}}$$
$$=\frac{\left(5^x.5^{-1}\right)^5}{(2^2)^{-\sqrt{y}}}$$
$$=\frac{\left(5^{5x}.5^{-5}\right)}{(2^{\sqrt{y}})^{-2}}$$
$$=\frac{\left(40.5^{-5}\right)}{(25)^{-2}}$$
$$=\frac{\left(40.5^{-5}\right)}{\left(5^2\right)^{-2}}$$
$$=\frac{40}{5}$$
$$=8$$

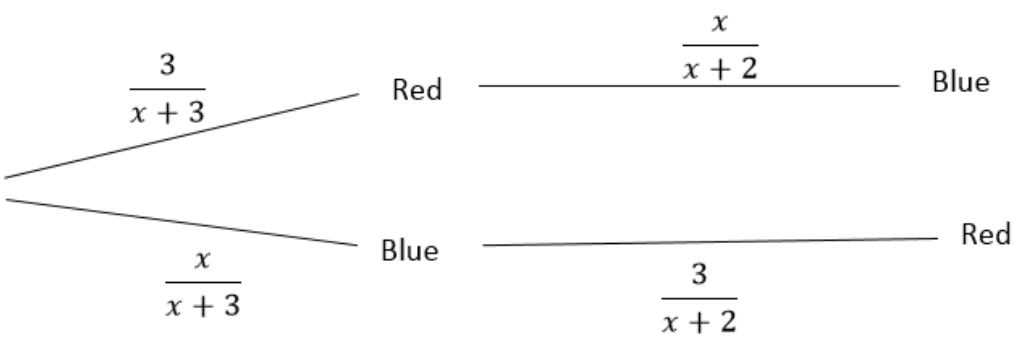
QUESTION 32

Answer: (B)

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

QUESTION 33

Answer: (C)



QUESTION 34

Answer: (D)

$\sin x \tan x - \sqrt{3} \sin x = 0$
$\sin x\left(\tan x - \sqrt{3}\right) = 0$
$\sin x = 0 \quad \text{or} \quad \tan x = \sqrt{3}$
$x = k.180° \quad \text{or} \quad x = 60° + k.180° \qquad k \in \mathbb{Z}$

QUESTION 35

Answer: (D)

$$g(x) - f(x) = -x^2 - 8x - (-2x - 8)$$
$$= -x^2 - 6x + 8$$

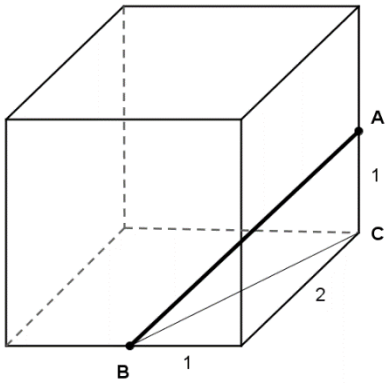
x-coordinate of Turning Point: $x = \dfrac{-b}{2a} = \dfrac{-(-6)}{2(-1)} = -3$

$$g(-3) - f(-3) = -(-3)^2 - 6(-3) + 8$$
$$= -9 + 18 + 8$$
$$= 17$$

QUESTION 36

Answer: (C)

$BC = \sqrt{2^2 + 1^2} = \sqrt{5} \qquad (Pythag)$
$AB = \sqrt{\left(\sqrt{5}\right)^2 + 1^2} = \sqrt{6} \qquad (Pythag)$



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)

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

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

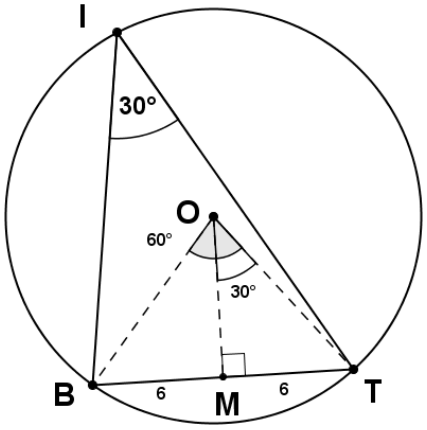
$$= 2\frac{b}{a}\cos A$$

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

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

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 ⊥ to chord

$\Delta OMB \equiv \Delta OMT$ SAS

$\therefore B\hat{O}M = T\hat{O}M$

But $B\hat{U}T = 60°$ $\angle$ at centre $= 2\times\angle$ at circle

$\therefore T\hat{O}M = 30°$

$$\sin T\hat{O}M = \sin 30° = \frac{1}{2} = \frac{6}{OT}$$

$\therefore radius\, OT = 12$

$\therefore diameter = 24$

QUESTION 40

Answer: (A)

$\alpha\beta\beta\epsilon\epsilon\epsilon\theta \quad \alpha\alpha\beta\beta\beta\beta\epsilon\epsilon\epsilon\epsilon\epsilon\epsilon\theta \quad \alpha\alpha\alpha\alpha\beta\beta\beta\beta\beta\beta\beta\beta\epsilon\epsilon\epsilon\epsilon\epsilon\epsilon\epsilon\epsilon\epsilon\epsilon\theta$

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