WAKISSHA MOCK EXAMINATION 2023

P425/2 UACE MATH 2 PROPOSED GUIDE.

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QN. 1

a(i)

From $P(B/A) = \frac{P(B\cap A)}{P(A)}$

$$P(A) = \frac{P(B\cap A)}{P(B/A)}$$

$$P(A) = \frac{1}{12} \times 3 \quad B_1$$

$$\therefore P(A) = \frac{1}{4} \quad A_1$$

(ii)

~~05~~

$$P(A/B') = \frac{P(A\cap B')}{P(B')}$$

But $P(A) = P(A\cap B') + P(A\cap B)$

$$P(A\cap B') = \frac{1}{4} - \frac{1}{12}$$

$$P(A\cap B') = \frac{1}{6} \quad B_1$$

$$P(A/B') = \frac{1}{6} \times \frac{6}{5}$$

$$P(A/B') = \frac{1}{5} \quad A_1$$

(b)

For Independent events $P(A\cap B) = P(A) \times P(B)$

$$\frac{1}{12} = \frac{1}{4} \times \frac{1}{6}$$

$$\frac{1}{12} \neq \frac{1}{24}.$$

Since $P(A\cap B) \neq P(A) \times P(B)$; these two events are not independent. B_1

QN. 2 (i)

Extract

Time (s)	240	300	360
Temperature (°c)	75	T_0	69

B1

$$\frac{69 - T_0}{360-300} = \frac{69-75}{360-240} \quad M_1$$

05

$$T_0 = 72°c$$

∴ Temperature of water was 72°c A1 after 300 s.

(ii)

Extract

Time (s)	450	600	T
Temperature (°c)	54	46	42

$$\frac{42-46}{T-600} = \frac{42-54}{T-450} \quad B_1$$

$$4(T-450) = 12(T-600)$$

$$T-450 = 3T-1800$$

$$2T = 1350$$

$$T = 675 \text{ seconds.}$$

∴ Temperature of water was 42°c after 675 s

A1

QN. 3

Assuming that the driver ~~applied~~ (ignore this statement) applied the breaks untill he reached the point of accident.

05

Initial speed, $u = 72\,kmh^{-1}$

$$u = \frac{72 \times 1000}{3600}$$

$$= 20\,ms^{-1}. \quad B_1$$

Final speed, $v = \frac{1}{2}$ of $72\,kmh^{-1}$

$$v = \frac{36 \times 1000}{3600}$$

$$= 10\,ms^{-1} \quad B_1$$

$s = 800m$

From s = Average Velocity x Time

$$s = \left(\frac{u+v}{2}\right)t.$$

$$800 = \frac{30}{2}t \quad M_1 B_1$$

$$t = 53.3333s$$

∴ He applied a break for 53.3333 seconds A1

QN. 4.

$$\frac{P_{2021}}{P_{2000}} \times 100 = 90$$

$$\frac{P_{2022}}{P_{2021}} = \frac{120}{100}$$

05

Let the price index of $\frac{P_{2022}}{P_{2000}} \times 100$ be x.

$$x = \left[\frac{P_{2022}}{P_{2021}} \cdot \frac{P_{2021}}{P_{2000}}\right] \times 100 \quad M_1$$

$$x = \left(\frac{120}{100} \cdot \frac{90}{100}\right) \times 100 \quad B_1$$

$$x = 108. \quad B_1$$

$$\frac{P_{2022}}{P_{2000}} \times 100 = 108$$

$$P_{2022} = \frac{108 \times 200000}{100} \quad B_1$$

$$= 216000$$

The price of item in 2022 is Shs. 216000 A_1

QN. 5

$$\int_1^2 x \sin x \, dx$$

Let $y = x \sin x$

$$h = \frac{2-1}{5}$$

$$h = \frac{1}{5} \quad B_1$$

x_n	y_0, y_5	$y_1 --- y_4$
1.0	0.84147	
6/5		1.11845
7/5		1.37963
8/5		1.59932
9/5		1.75293
2.0	1.81859	
sum	2.66006	5.85033

B1 – All the x-values correct
B2 – all y-values correct and recorded to atleast 4dps

05

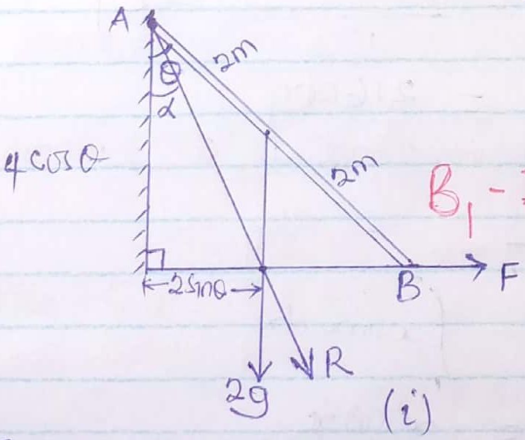
$$\int_1^2 x\sin x\,dx \simeq \frac{1}{2}\times\frac{1}{5}\left(2.6606 + 2\times 5.85033\right) \quad M_1$$

$$\simeq 1.436132$$

$$\int_1^2 x\sin x\,dx \simeq 1.436 \quad (3dps) \quad A_1$$

QN. 6

sketch



Let R = Reaction at A
θ = Inclination of rod to the vertical
$\theta = 30°$

B1 – Including all relevent forces

Taking moment at A

$A\circlearrowleft;\ 2g\times 2\sin\theta = F\times 4\cos\theta$ M_1

$F = \dfrac{4g\sin\theta}{4\cos\theta}$

$F = g\tan\theta$

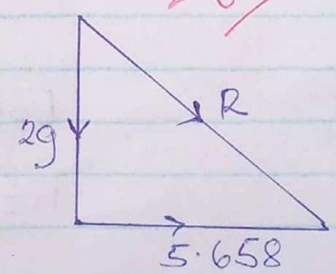
$F = g\tan 30$

$F = \underline{\underline{5.658N}}$ A_1

Deny – Without units

(ii)

05



$R^2 = (2g)^2 + \left(\frac{1}{\sqrt{3}}g\right)^2$ M_1

$R^2 = 4g^2 + \dfrac{g^2}{3}$

$R^2 = \dfrac{13g^2}{3}$

$R = \sqrt{\dfrac{13}{3}}\,g$

$R = \underline{\underline{20.4N}}.$ A_1

QN. 7 (a).

Let Jane be represented by J
Alice = A
Mary = M.

$P(A \text{ wins on first attempt}) = P(J' \cap M' \cap A)$

$= \frac{5}{6} \times \frac{5}{6} \times \frac{1}{6}$ m_1

$\therefore$ Probability that Alice wins on first attempt. $= \frac{25}{216}$ A_1

Accept: Decimals to atleast 4dps

7 (b).

P(Jane wins the game)

$= \frac{1}{6} + \left(\frac{5}{6} \times \frac{5}{6} \times \frac{5}{6} \times \frac{1}{6}\right) + \left(\frac{5}{6} \times \frac{5}{6} \times \frac{5}{6} \times \frac{5}{6} \times \frac{5}{6} \times \frac{5}{6} \times \frac{1}{6}\right) + \ldots$

$= \frac{1}{6} + \left(\frac{5}{6}\right)^3 \cdot \frac{1}{6} + \left(\frac{5}{6}\right)^6 \times \frac{1}{6} + \ldots\ldots$ m_1

$= \frac{1}{6}\left[1 + \left(\frac{5}{6}\right)^3 + \left(\frac{5}{6}\right)^6 + \ldots\right]$

05

From G.P $S_\infty = \frac{a}{1-r}$

$= \frac{1}{6}\left[\frac{1}{1-\left(\frac{5}{6}\right)^3}\right]$ m_1

$= \frac{1}{6}\left[\frac{6^3}{6^3-5^3}\right]$

$= \frac{36}{91}$

$\therefore$ Probability that Jane wins the game $= \underline{\underline{\frac{36}{91}}}$ A_1

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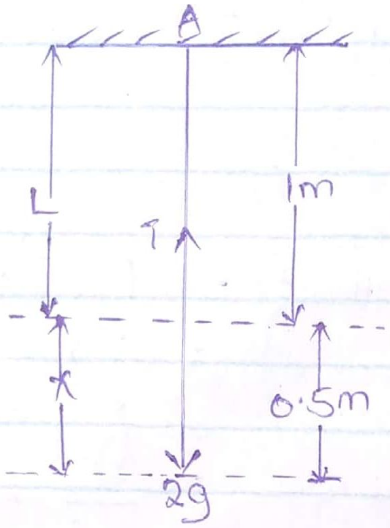
QN. 8



B1

05

Let L = Natural length, x = Extension, λ = Modulus of elasticity., T = Tension in the string

At equilibrium (rest) T = 2g. B1

$$\text{Using } T = \frac{\lambda x}{L}$$

$$\lambda = \frac{TL}{x}$$

$$\lambda = \frac{2g \times 1}{0.5} \quad M_1 B_1$$

$$\lambda = 2 \times 9.8 \times 2$$

$$\lambda = 39.2N.$$

$\therefore$ The modulus of elasticity of the string is 39.2N A1

Deny: Without units

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