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IYGB - MMS PAPER O - QUESTION 1

USING A CALCULATOR IN STATS MODE TO OBTAIN THE P.M.C.C

(x) GEOGRAPHY %	80	29	56	56	58	45	67	72
(y) HISTORY %	78	49	65	50	75	50	60	47

$$r = 0.4896746\ldots \simeq 0.4897$$

NEXT SETTING HYPOTHESES

- $H_0: \rho = 0$
- $H_1: \rho > 0$, WHERE ρ IS THE P.M.C.C OF THE ENTIRE POPULATION, NOT THAT OF THE SAMPLE OF 8

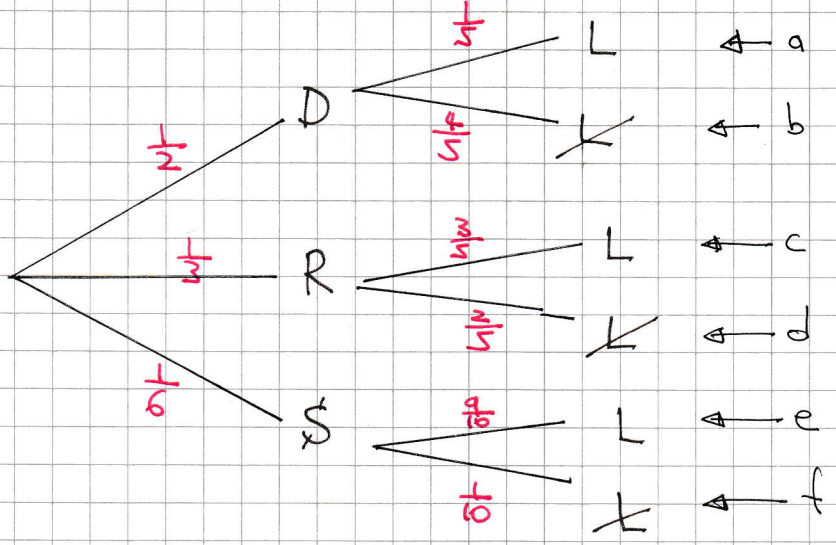
THE CRITICAL VALUE FOR $n=8$, AT 10% SIGNIFICANCE IS 0.5067

AS $0.4897 < 0.5067$ THERE IS NO SIGNIFICANT EVIDENCE OF POSITIVE CORRELATION BETWEEN THE PERCENTAGE MARKS IN GEOGRAPHY & HISTORY.

THERE IS NO SUFFICIENT EVIDENCE TO REJECT H_0

IYGB - MMS PAPER O - QUESTION 2

DRAWING A TREE DIAGRAM



a) $P(L) = a + c + e$

$= \left(\frac{1}{2} \times \frac{1}{5}\right) + \left(\frac{1}{3} \times \frac{3}{5}\right) + \left(\frac{1}{6} \times \frac{9}{10}\right)$

$= \frac{1}{10} + \frac{1}{5} + \frac{3}{20}$

$= \frac{9}{20} = 0.45$

b) $P(R|L) = \frac{P(R \cap L)}{P(L)} = \frac{\frac{1}{3} \times \frac{3}{5}}{\frac{9}{20}} = \frac{\frac{1}{5}}{\frac{9}{20}} = \frac{4}{9}$

OR

$\frac{c}{a + c + e}$

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IYGB - MMS PAPER O - QUESTION 3

9)

TIME (IN SECONDS)	* FREQUENCY	* FREQUENCY DENSITY
$0 < t \leq 10$ (10)	30	$30 \div 10 = 3$
$10 < t \leq 15$ (5)	35	$35 \div 5 = 7$
$15 < t \leq 18$ (3)	33	$33 \div 3 = 11$
$18 < t \leq 20$ (2)	20	$20 \div 2 = 10$
$20 < t \leq 30$ (10)	25	$25 \div 10 = 2.5$
$30 < t \leq 50$ (20)	10	$10 \div 20 = 0.5$

$$\text{FREQUENCY DENSITY} = \frac{\text{FREQUENCY}}{\text{CLASS WIDTH}}$$

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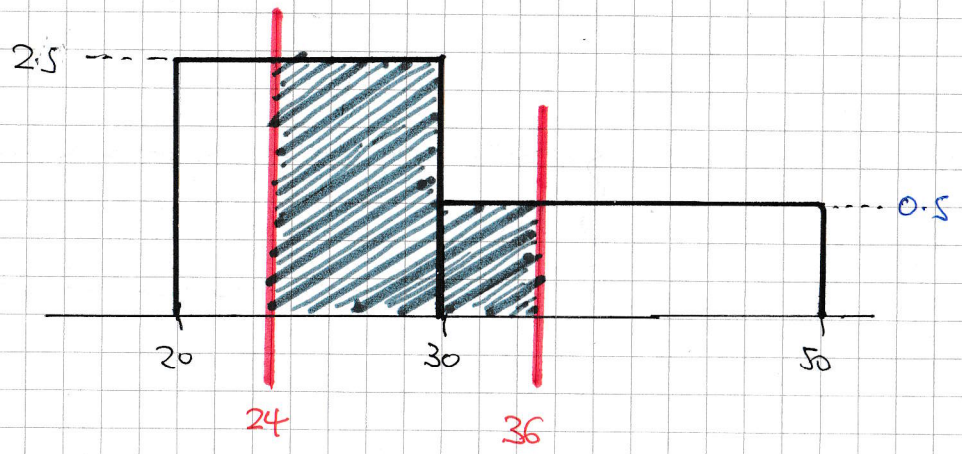
b)



APPROXIMATELY $\approx (6\times 2.5)+(6\times 0.5) \approx$ 18 PATIENTS

c) USING THE MIDPOINTS :

m	5	12.5	16.5	19	25	40
f	30	35	33	20	25	10

FROM CALCULATOR

$\sum x = 2537$ $\quad \sum x^2 = 54048$ $\quad n = 153$

- $\bar{x} = \dfrac{\sum x}{n} = \dfrac{2537}{153} \approx 16.6$
- $\sigma = \sqrt{\dfrac{\sum x^2}{n} - \bar{x}^2} = \sqrt{\dfrac{54048}{153} - 16.581..^2} \simeq 8.85$

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IYGB - MMS PAPER O - QUESTION 4

LOOKING AT THE GIVEN SUMMARY STATISTICS

$$\sum_{n=1}^{40}(x_n-50)=140 \qquad \sum_{n=1}^{40}(x_n-50)^2=4490$$

LET $y=x-50$

$$\sum y=140 \qquad \sum y^2=4490 \qquad n=40$$

CALCULATE THE MEAN & STANDARD DEVIATION IN y

$$\bar{y}=\frac{\sum y}{n}=\frac{140}{40}=3.5$$

$$\sigma_y=\sqrt{\frac{\sum y^2}{n}-\bar{y}^2}=\sqrt{\frac{4490}{40}-3.5^2}=10$$

UNCODE BACK INTO x

- $\bar{x}=\bar{y}+50$

  $\bar{x}=3.5+50$

  $\bar{x}=53.5$

- $\sigma_x=\sigma_y$

  $\sigma_x=10$

(STANDARD DEVIATION DOES NOT GET AFFECTED BY ADDITION/SUBTRACTION)

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IYGB – MMS PAPER O – QUESTION 5

a) X = NUMBER OF PINS WITH FLAWS

$X \sim B(20, 0.1)$

I) $P(X=3) = \binom{20}{3}(0.1)^3(0.9)^{17} \simeq \underline{0.1901}$

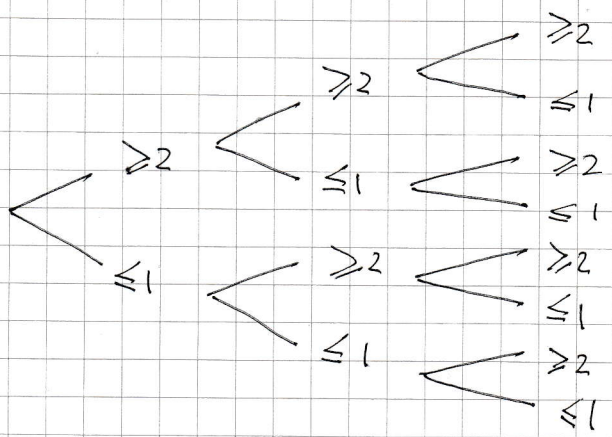
II) $P(X \geqslant 2) = 1 - P(X \leqslant 1)$ ... tables

$= 1 - 0.3917$

$= \underline{0.6083}$

b) USING ALL THE OUTCOMES OR BY SETTING ANOTHER DISTRIBUTION OR A TREE DIAGRAM

$\boxed{P(X \geqslant 2) = 0.6083}$ & $\boxed{P(X \leqslant 1) = 0.3917}$



THE REQUIRED PROBABILITY IS GIVEN BY ALL THE BRANCHES ABOVE EXCEPT THE BOTTOM ONE

OR $1 - [P(X \leqslant 1)]^3 = 1 - 0.3917^3 = \underline{0.9399}$

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IYGB - MMS PAPER O - QUESTION 5

c) SETTING UP HYPOTHESES

- $H_0 : p = 0.1$
- $H_1 : p > 0.1$
- WHERE p REPRESENTS THE PROPORTION OF PINS WITH FLAWS IN THE ENTIRE POPULATION & NOT IN THE SAMPLE

TESTING AT 5% SIGNIFICANCE ON THE BASIS THAT $X = 5$

$$P(X \geqslant 5) = 1 - P(X \leqslant 4)$$

... table ...

$$= 1 - 0.9568$$

$$= 0.0432$$

$$= 4.32\%$$

$$< 5\%$$

THERE IS SIGNIFICANT EVIDENCE AT 5% THAT THE PROPORTION OF PINS WITH FLAWS IS HIGHER THAN 10%

WE DO NOT HAVE ENOUGH EVIDENCE TO REJECT H_1

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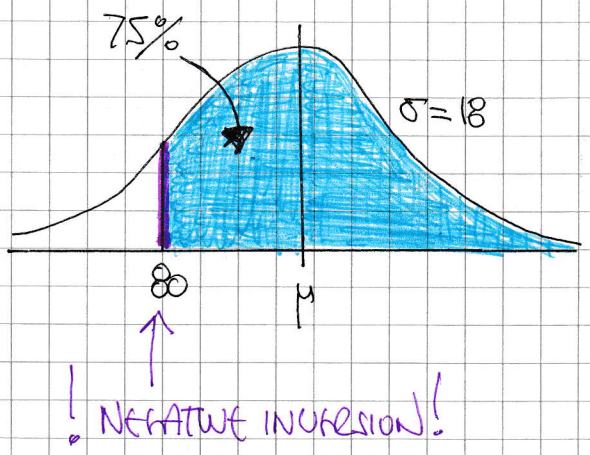
IYGB – MMS PAPER O – QUESTION 6

a) X = Paul's training time

$X \sim N(\mu, 18^2)$



! NEGATIVE INVERSION !

$\Rightarrow P(X>80) = 0.75$

$\Rightarrow P\left(Z > \frac{80-\mu}{18}\right) = 0.75$

INVERSION

$\Rightarrow \frac{80-\mu}{18} = -\Phi^{-1}(0.75)$

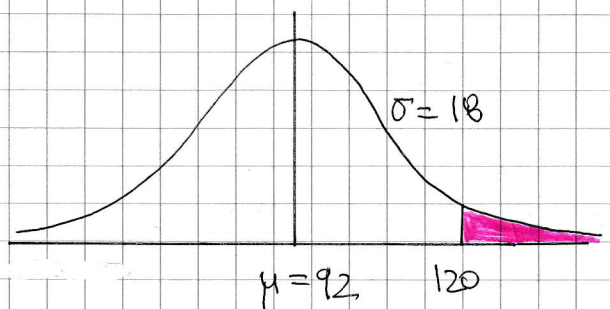
$\Rightarrow \frac{80-\mu}{18} = -0.674$

$\Rightarrow 80-\mu = -12.132$

$\Rightarrow \mu = 92.132$

$\therefore$ 92 MINUTES

b)



$P(X>120)$

$= 1 - P(X<120)$

$= 1 - P\left(Z < \frac{120-92}{18}\right)$

$= 1 - \Phi(1.555\ldots)$

$= 1 - 0.94009$

$\simeq 0.05999$

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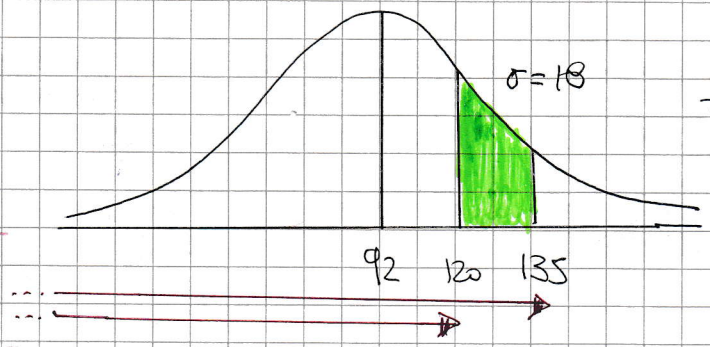
c) WE ARE REQUIRED TO FIND $P(X<135 \mid X>120)$

$$= \frac{P(X<135 \cap X>120)}{P(X>120)}$$

$$= \frac{P(120<X<135)}{P(X>120)}$$



- $P(120<X<135) = P(X<135) - P(X<120)$

$$= P\left(Z<\frac{135-92}{18}\right) - P\left(Z<\frac{120-92}{18}\right)$$

$$= \Phi(2.3888\ldots) - \Phi(1.5555\ldots)$$

$$= 0.99155 - 0.94009$$

$$= 0.05146$$

- THE REQUIRED PROBABILITY IS $\frac{0.05146}{0.05999} \approx 0.8578$

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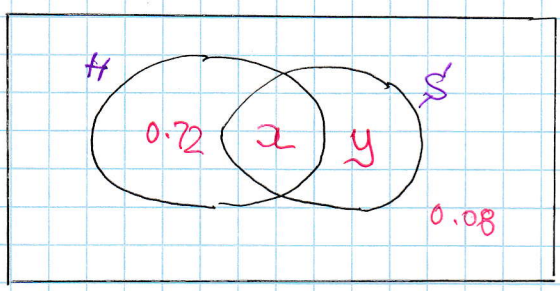
IYGB – MMS PAPER O – QUESTION 7

H = having a haircut
S = having a shave

a) $P(H \cap S') = 0.72$, $P(S|H) = 0.2$, $P(S' \cap H') = 0.08$

FILL IN A VENN DIAGRAM



- $x + y + 0.72 + 0.08 = 1$

  $x + y = 0.2$

- $P(S|H) = \dfrac{P(S \cap H)}{P(H)}$

  $\Rightarrow 0.2 = \dfrac{x}{x + 0.72}$

  $\Rightarrow 0.2(x + 0.72) = x$

  $\Rightarrow 0.2x + 0.144 = x$

  $\Rightarrow 0.144 = 0.8x$

  $\Rightarrow x = 0.18$

  & HENCE $y = 0.02$

$\therefore P(S \cap H) = x = 0.18$

b) $P(S|H) = 0.2 = P(S)$ ← $x + y = 0.2$

$\therefore$ EVENTS ARE INDEPENDENT

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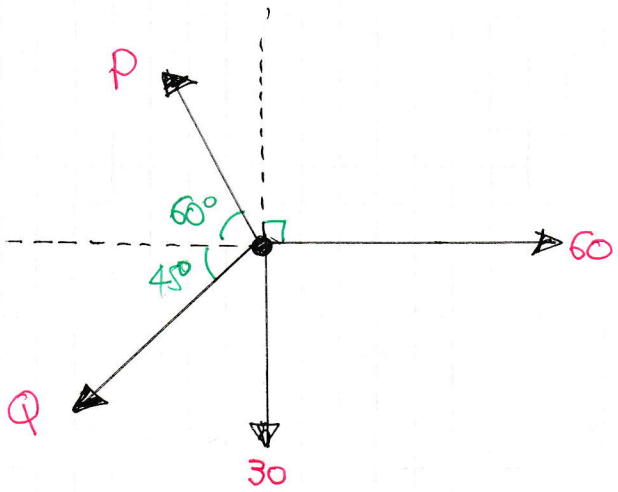
IYGB – MMS PAPER O – QUESTION 8



● RESOLVING VERTICALLY AND HORIZONTALLY, WE OBTAIN

$$(\uparrow): P\sin 60 = Q\sin 45 + 30$$
$$(\rightarrow): P\cos 60 + Q\cos 45 = 60$$

● TIDYING UP THE ABOVE EQUATIONS

$$\left.\begin{aligned} \tfrac{\sqrt{3}}{2}P &= \tfrac{\sqrt{2}}{2}Q + 30 \\ \tfrac{1}{2}P + \tfrac{\sqrt{2}}{2}Q &= 60 \end{aligned}\right\} \Rightarrow \left.\begin{aligned} \sqrt{3}P &= \sqrt{2}Q + 60 \\ P + \sqrt{2}Q &= 120 \end{aligned}\right\} \Rightarrow$$

$$\left.\begin{aligned} \sqrt{3}P &= \sqrt{2}Q + 60 \\ P &= 120 - \sqrt{2}Q \end{aligned}\right\} \Rightarrow \text{ADDING} \Rightarrow (\sqrt{3}+1)P = 180$$

$$\Rightarrow P = \frac{180}{\sqrt{3}+1}$$

$$\Rightarrow P = \frac{180(\sqrt{3}-1)}{(\sqrt{3}+1)(\sqrt{3}-1)}$$

$$\Rightarrow P = \frac{180(\sqrt{3}-1)}{2}$$

$$\Rightarrow P = 90(\sqrt{3}-1)$$

● FINALLY TO FIND Q WE HAVE

$$P + \sqrt{2}Q = 120$$
$$\sqrt{2}P + 2Q = 120\sqrt{2}$$
$$\sqrt{2}\left[90(\sqrt{3}-1)\right] + 2Q = 120\sqrt{2}$$
$$45\sqrt{2}(\sqrt{3}-1) + Q = 60\sqrt{2}$$
$$45\sqrt{6} - 45\sqrt{2} + Q = 60\sqrt{2}$$
$$Q = 105\sqrt{2} - 45\sqrt{6}$$

$$\therefore Q = 15\left[7\sqrt{2} - 3\sqrt{6}\right]$$

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IYGB – MMS PAPER O – QUESTION 9

a) LOOKING AT THE FIRST JOURNEY (UP TO HALF A SECOND AFTER PROJECTION)

$u = 14\ ms^{-1}$
$a = -9.8\ ms^{-2}$
$s = ?$
$t = 0.5\ s$
$V = ?$

- $V = u + at$
- $\Rightarrow V = 14 - 9.8 \times 0.5$
- $\Rightarrow V = 9.1\ ms^{-1}$

- $s = \frac{1}{2}(u+v)t$
- $\Rightarrow s = \frac{1}{2}(14+9.1) \times 0.5$
- $\Rightarrow s = 5.775\ m$

b)

METHOD A

LOOKING AT THE JOURNEY UP

$u = 14\ ms^{-1}$
$a = -9.8\ ms^{-2}$
$s = ?$
$t = ?$
$V = 0$

- $V = u + at$
- $\Rightarrow 0 = 14 - 9.8t$
- $\Rightarrow 9.8t = 14$
- $\Rightarrow t = \frac{10}{7}$

- $V^2 = u^2 + 2as$
- $\Rightarrow 0 = 14^2 + 2(-9.8)s$
- $\Rightarrow 19.6s = 196$
- $\Rightarrow s = 10$

LOOKING AT THE JOURNEY DOWN

$u = 0\ ms^{-1}$
$a = +9.8\ ms^{-2}$
$S = ?$
$t = 2 - \frac{10}{7} = \frac{4}{7}$
$V =$

- $s = ut + \frac{1}{2}at^2$
- $\Rightarrow s = \frac{1}{2}(9.8)\left(\frac{4}{7}\right)^2$

METHOD B

LOOKING AT THE JOURNEY UP

$u = 14\ ms^{-1}$
$a = -9.8$
$s = ?$
$t =$
$V = 0$

- $V^2 = u^2 + 2as$
- $\Rightarrow 0 = 14^2 + 2(-9.8)s$
- $\Rightarrow 19.6s = 196$
- $\Rightarrow s = 10$

NOW LOOKING AT THE ENTIRE JOURNEY

$u = 14\ ms^{-1}$
$a = -9.8\ ms^{-2}$
$s = ?$
$t = 2$
$V =$

- $s = ut + \frac{1}{2}at^2$
- $\Rightarrow s = 14 \times 2 + \frac{1}{2}(-9.8) \times 2^2$

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IYGB – MMS PAPER O – QUESTION 9

$\Rightarrow S = 1.6\text{ m}$

$\therefore$ TOTAL DISTANCE COVERED IS

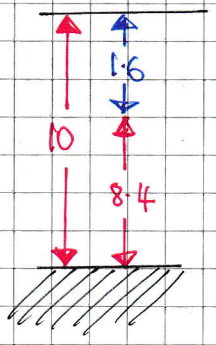
$10 + 1.6 = 11.6\text{ m}$

$\Rightarrow S = 28 - 19.6$

$\Rightarrow S = 8.4\text{ m}$

LOOKING AT THE DIAGRAM THE REQUIRED DISTANCE IS

$2 \times 10 - 8.4 = 11.6\text{ m}$



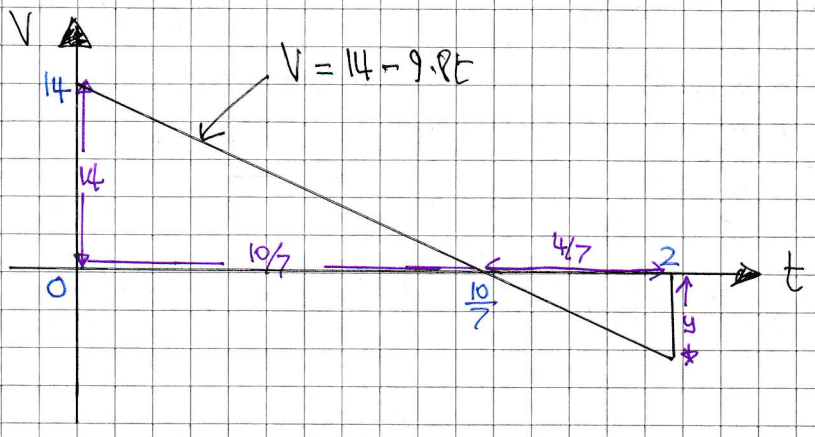
METHOD C

LOOKING AT THE JOURNEY TO THE HIGHEST POINT

$u = 14\text{ ms}^{-1}$
$a = -9.8\text{ ms}^{-2}$
$s =$
$t = ?$
$v = 0\text{ ms}^{-1}$

- $v = u + at$
- $\Rightarrow 0 = 14 - 9.8t$
- $\Rightarrow 9.8t = 14$
- $\Rightarrow t = \frac{10}{7}$

NOW BY A VELOCITY TIME GRAPH



BY SIMILAR TRIANGLES

$\frac{y}{\frac{4}{7}} = \frac{14}{\frac{10}{7}}$

$\frac{10}{7}y = 8$

$y = 5.6\text{ ms}^{-1}$

OR $v = u + at$

$v = 14 - 9.8 \times 2$

$v = -5.$

$\therefore$ TOTAL DISTANCE $= \left(\frac{1}{2} \times 14 \times \frac{10}{7}\right) + \left(\frac{1}{2} \times \frac{4}{7} \times y\right)$

$= 10 + 1.6$

$= 11.6\text{ m}$

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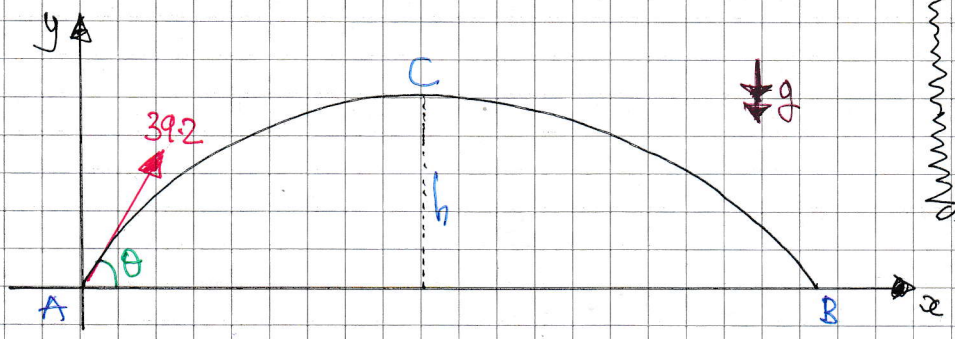
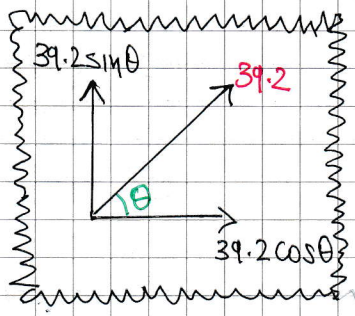
IYGB – MMS PAPER O – QUESTION 10

START WITH A PROJECTILE DIAGRAM





LOOKING AT THE VERTICAL MOTION FROM A TO C

$u = 39.2\sin\theta$ ms^{-1}	
$a = -9.8$ ms^{-2}	
$s = ?$	
$t = 3$ s	
$v = 0$ ms^{-1}	

a) $v = u + at$

$\Rightarrow 0 = 39.2\sin\theta - 9.8 \times 3$

$\Rightarrow 29.4 = 39.2\sin\theta$

$\Rightarrow \sin\theta = \frac{3}{4}$ // AS REQUIRED

b) $s = ut + \frac{1}{2}at^2$

$\Rightarrow s = (39.2\sin\theta) \times 3 + \frac{1}{2}(-9.8) \times 3^2$

$\Rightarrow s = \left(39.2 \times \frac{3}{4} \times 3\right) - (4.9 \times 9)$

$\Rightarrow s = 88.2 - 44.1$

$\Rightarrow s = 44.1$ m //

c) BY SYMMETRY THE TOTAL FLIGHT TIME WILL BE $2 \times 3 = 6$ SECONDS

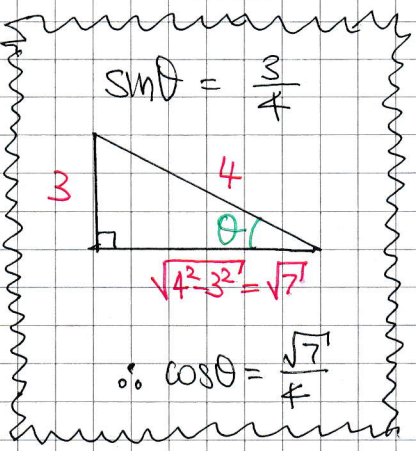
LOOKING AT THE HORIZONTAL DISPLACEMENT

DISTANCE = CONSTANT SPEED × TIME

DISTANCE $= 39.2\cos\theta \times 6$

DISTANCE $= 39.2 \times \frac{\sqrt{7}}{4} \times 6$

DISTANCE ≈ 155.57 m //



IYGB - MMS PAPER O - QUESTION 10

d) LEAST SPEED OCCURS AT THE HIGHEST POINT OF THE PATH, POINT C

AT THAT POINT (C) THERE IS ONLY HORIZONTAL VELOCITY

$$\therefore \text{LEAST SPEED} = 39.2\cos\theta$$

$$= 39.2 \times \frac{\sqrt{2}}{4}$$

$$\approx 25.93 \text{ ms}^{-1}$$

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IYGB – MMS PAPER O – QUESTION 11

USING THE EQUATION $\underline{r} = \underline{r}_0 + \underline{u}t + \frac{1}{2}\underline{a}t^2$ FOR EACH PARTICLE.

$$\underline{r}_A = \begin{pmatrix} 7 \\ -2 \end{pmatrix} + \begin{pmatrix} 2 \\ 3 \end{pmatrix}t + \frac{1}{2}\begin{pmatrix} 0.1 \\ 0.2 \end{pmatrix}t^2$$

$$\underline{r}_B = \underline{r}_0 + \begin{pmatrix} 3 \\ 5 \end{pmatrix}t + \frac{1}{2}\begin{pmatrix} -0.2 \\ 0.3 \end{pmatrix}t^2$$

IT IS GIVEN THAT $\underline{r}_A = \underline{r}_B$ WHEN $t = 10$

$$\begin{pmatrix} 7 \\ -2 \end{pmatrix} + 10\begin{pmatrix} 2 \\ 3 \end{pmatrix} + \frac{1}{2}\times 100\begin{pmatrix} 0.1 \\ 0.2 \end{pmatrix} = \underline{r}_0 + 10\begin{pmatrix} 3 \\ 5 \end{pmatrix} + \frac{1}{2}\times 100\begin{pmatrix} -0.2 \\ 0.3 \end{pmatrix}$$

$$\begin{pmatrix} 7 \\ -2 \end{pmatrix} + \begin{pmatrix} 20 \\ 30 \end{pmatrix} + \begin{pmatrix} 5 \\ 10 \end{pmatrix} = \underline{r}_0 + \begin{pmatrix} 30 \\ 50 \end{pmatrix} + \begin{pmatrix} -10 \\ 15 \end{pmatrix}$$

$$\begin{pmatrix} 32 \\ 38 \end{pmatrix} = \underline{r}_0 + \begin{pmatrix} 20 \\ 65 \end{pmatrix}$$

$$\underline{r}_0 = \begin{pmatrix} 12 \\ -27 \end{pmatrix}$$

$\therefore$ IT STARTS FROM $12\underline{i} - 27\underline{j}$

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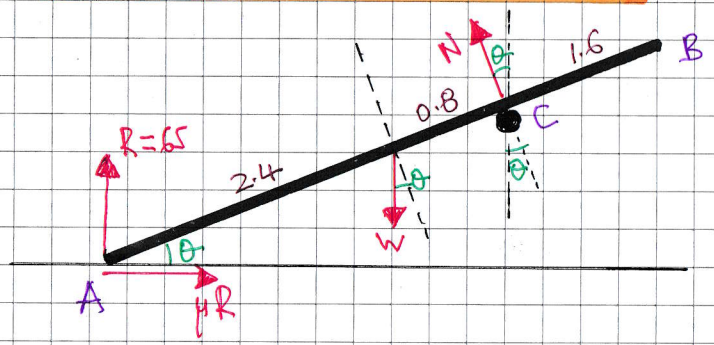
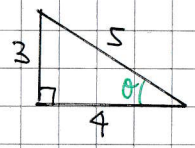
IYGB - MMS PAPER O - QUESTION 12

START WITH A DETAILED DIAGRAM



- $\tan\theta = \frac{3}{4}$
- $\mu = \frac{9}{13}$



- $R = 65$

$\sin\theta = \frac{3}{5}$

$\cos\theta = \frac{4}{5}$

FORM 3 EQUATIONS BY RESOLVING & TAKING MOMENTS

$(\uparrow)$: $R + N\cos\theta = W$ (I)

$(\rightarrow)$: $\mu R = N\sin\theta$ (II)

$\curvearrowright_A$: $W\cos\theta \times 2.4 = N \times 3.2$ (III)

b) FROM EQUATION (II) DIRECTLY

$\Rightarrow \mu R = N\sin\theta$

$\Rightarrow \frac{9}{13} \times 65 = N \times \frac{3}{5}$

$\Rightarrow 45 = \frac{3}{5}N$

$\Rightarrow N = 75$

a) EITHER USING (I) OR (III) GIVES

$R + N\cos\theta = W$

$\Rightarrow 65 + 75 \times \frac{4}{5} = W$

$\Rightarrow 65 + 60 = W$

$\Rightarrow W = 125$

OR

$\Rightarrow W\cos\theta \times 2.4 = N \times 3.2$

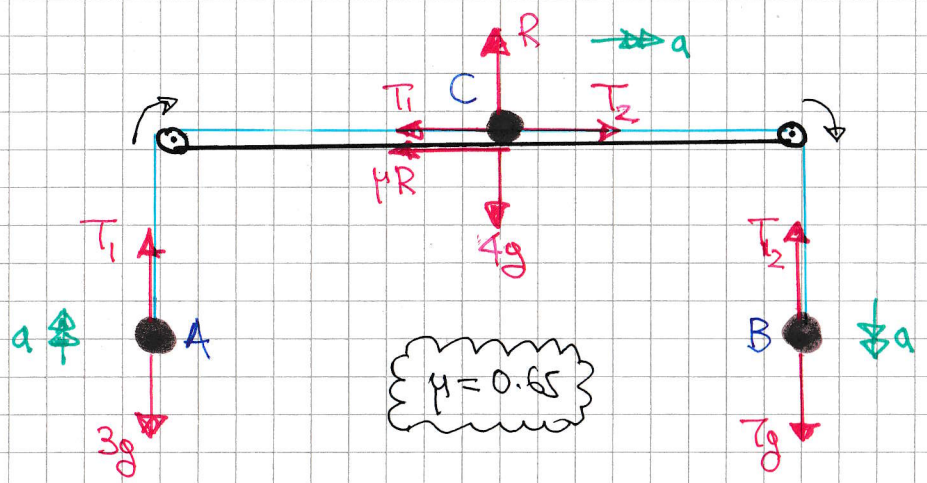
$\Rightarrow W \times \frac{4}{5} \times 2.4 = 75 \times 3.2$

$\Rightarrow 1.92W = 240$

$\Rightarrow W = 125$

IYGB – MMS PAPER O – QUESTION 13

START WITH A DIAGRAM



LOOKING AT THE EQUATION OF MOTION FOR EACH PARTICLE

$$\left.\begin{array}{l} (A): T_1 - 3g = 3a \\ (B): 7g - T_2 = 7a \\ (C): T_2 - T_1 - \mu R = 4a \end{array}\right\} \Rightarrow \boxed{T_1 = 3a + 3g}$$

$$\left.\begin{array}{l} (B): 7g - T_2 = 7a \\ (C): T_2 - (3a + 3g) - \mu(4g) = 4a \end{array}\right\} \Rightarrow$$

$$\left.\begin{array}{l} (B): -T_2 + 7g = 7a \\ (C): T_2 - 3a - 3g - \frac{13}{5}g = 4a \end{array}\right\} \text{ADDING}$$

$$\Rightarrow \frac{7}{5}g - 3a = 11a$$

$$\Rightarrow 14a = \frac{7}{5}g$$

$$\Rightarrow a = \frac{1}{10}g = 0.98\ ms^{-2}$$

FINALLY WE HAVE

$$(A): T_1 = 3a + 3g$$

$$T_1 = 3(0.98) + 3g$$

$$T_1 = 32.34\ N$$

$$(B)\quad T_2 = 7g - 7a$$

$$T_2 = 7g - 7(0.98)$$

$$T_2 = 61.74$$

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IYGB - MMS PAPER O - QUESTION 14

$V = t^2 - 2t - 24$, $t \geqslant 0$ SUBJECT TO $t=3$, $x=0$

a) OBTAIN THE ACCELERATION BY DIFFERENTIATING THE VELOCITY

$$a = \frac{dV}{dt} = \frac{d}{dt}\left(t^2 - 2t - 24\right)$$

$$a = 2t - 2$$

$$a\Big|_{t=3} = 2\times 3 - 2$$

$$a\Big|_{t=3} = 4 \text{ ms}^{-2}$$

b) FIND THE TIMES WHEN $V=0$

$$\Rightarrow 0 = t^2 - 2t - 24$$

$$\Rightarrow 0 = (t+4)(t-6)$$

$$\Rightarrow t = \cancel{-4\text{ s}}, \ 6 \text{ s}$$

USING INTEGRATION TO OBTAIN AN EXPRESSION FOR THE DISPLACEMENT x

$$\Rightarrow x = \int V \, dt = \int t^2 - 2t - 24 \, dt$$

$$\Rightarrow x = \frac{1}{3}t^3 - t^2 - 24t + C$$

APPLY CONDITION $t=3$, $x=0$

$$\Rightarrow 0 = \frac{1}{3}\times 3^3 - 3^2 - 24\times 3 + C$$

$$\Rightarrow 0 = 9 - 9 - 72 + C$$

$$\Rightarrow C = 72$$

$$\Rightarrow x = \frac{1}{3}t^3 - t^2 - 24t + 72$$

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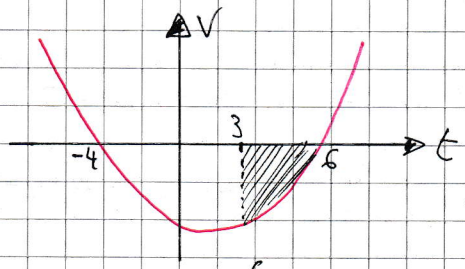
FINALLY WHEN $t=6$

$$x(6) = \frac{1}{3}\times 6^3 - 6^2 - 24\times 6 + 72$$
$$= 72 - 36 - 144 + 72$$
$$= -36$$

$\therefore$ A DISTANCE OF 36m FROM O

ALTERNATIVE FOR PART (b)
USING VELOCITY TIME GRAPH

$$v = t^2 - 2t - 24$$
$$v = (t+4)(t-6)$$



$$\text{DISPLACEMENT} = \int_3^6 t^2 - 2t - 24\,dt$$
$$= \left[\frac{1}{3}t^3 - t^2 - 24t\right]_3^6$$
$$= (72 - 36 - 144) - (9 - 9 - 72)$$
$$= -36 \text{ AS BEFORE}$$

c) USING $x = \frac{1}{3}t^3 - t^2 - 24t + 72$ WITH $x=0$ & NOTING $t=3$ IS A KNOWN SOLUTION (GIVEN AS CONDITION)

$$\Rightarrow \frac{1}{3}t^3 - t^2 - 24t + 72 = 0$$
$$\Rightarrow t^3 - 3t^2 - 72t + 216 = 0$$
$$\Rightarrow t^2(t-3) - 72(t-3) = 0 \quad \text{(OR USE ALGEBRAIC DIVISION)}$$
$$\Rightarrow (t-3)(t^2 - 72)$$
$$\Rightarrow t = 3 \quad \text{OR} \quad t^2 = 72$$

$$\therefore t = +\sqrt{72} \approx 8.49\text{s}$$

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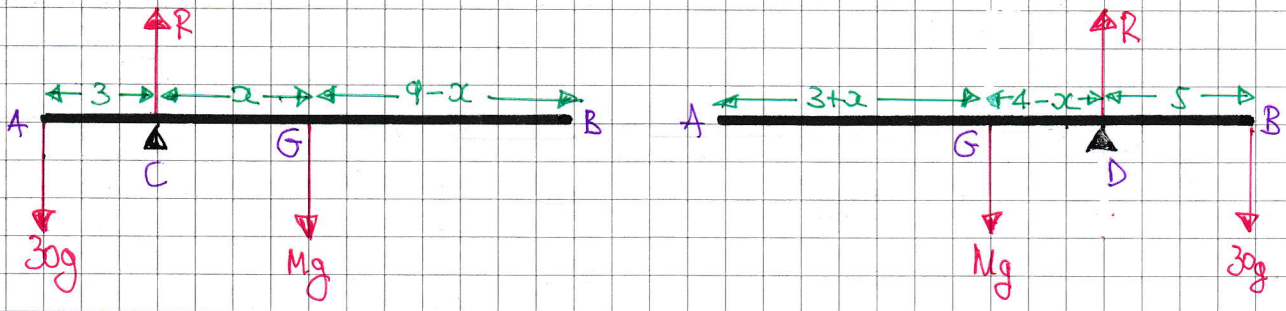
IYGB – MMS PAPER O – QUESTION 15

(a|b) START WITH TWO SEPARATE DIAGRAMS SHOWING EACH OF THE TWO CASES



NOTE THAT $R = 30g + Mg$ IN BOTH CASES AND $|AG| = 3 + x$

TAKING MOMENTS ABOUT C & ABOUT D IN EACH CASE TO ELIMINATE R

$\curvearrowleft_C$: $30g \times 3 = Mgx$

$Mx = 90$

$\curvearrowleft_D$: $Mg(4-x) = 30g \times 5$

$M(4-x) = 150$

$4M - Mx = 150$

$\Rightarrow 4M - 90 = 150$

$\Rightarrow 4M = 240$

$\Rightarrow M = 60$

NOW WE CAN FIND THE VALUE OF x & SUBSEQUENTLY THE DISTANCE $|AG|$

$\Rightarrow Mx = 90$

$\Rightarrow 60x = 90$

$\Rightarrow x = 1.5$

$\therefore |AG| = 3 + x$

$|AG| = 4.5\text{ m}$

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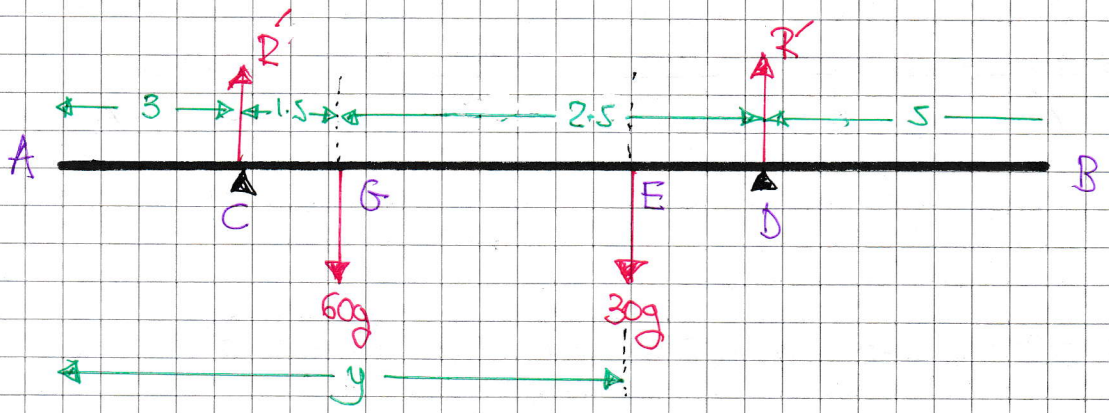
c) START WITH A NEW DIAGRAM



- $2R' = 60g + 30g$

  $2R' = 90g$

  $R' = 45g$

- $\curvearrowleft A : (60g \times 4.5) + (30g \times y) = (R' \times 3) + (R' \times 7)$

  $270g + 30gy = 3R' + 7R'$

  $270g + 30gy = 10R'$

  $270g + 30gy = 10 \times 45g$

  $270 + 30y = 450$ $\quad \div 10$

  $27 + 3y = 45$ $\quad \div 3$

  $9 + y = 15$

  $y = 6$ m