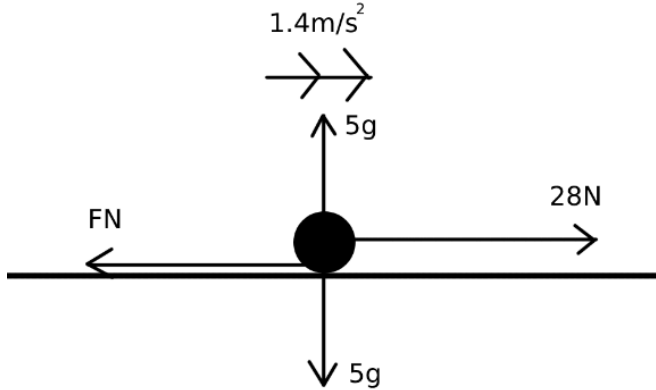


Edexcel 9MA0 03 (Mathematics Paper 3) Unofficial Mark Scheme 2023

Mechanics

Question	Answer	Comments	Marks
1) SUVAT a) Find the speed b) Find the distance	a. 16ms^{-1} b. 40m		1 2
2) Forces a) Find reaction force ($R = mg$) b) Find frictional force c) Find coefficient of friction	a. $R = 5g$ (49N) ($g=9.8$) b. $F = 21$ c. $\mu = 0.43$ (2sf)		1 2 1

3) SUVAT a) Find speed b) Find T c) AFind c	a. 7.62ms^{-1} b. $T = 10$ c. $C = 10$	Part a is incorrect, should be $2\sqrt{5}$ aka 4.47	4 3 3
4) Vector a) speed/velocity through A ($t=0$) b) c) Find the values of t when it is moving in the direction of $(i+j)$ d) Find the time when moving perpendicular to i	a. $v = 2\sqrt{5}\text{ms}^{-1}$ b. $a = (2t-3)i + 4tj \text{ ms}^{-2}$ c. $t = 2$ seconds only d. 1.5 seconds	c) reject $t = -5$ since $t > 0$ Wheres a and b \checkmark	4 3 3
5) Projectiles (?) a) Show that $T = 10/7\cos(\alpha)$ b) Show that $\tan^2(\alpha) - 4\tan(\alpha) + 3 = 0$ c) Find the max height	a. Self explanatory b. Self explanatory use $\sec^2 = 1 + \tan^2$ c. 36m d. wind direction, doesn't take into account rotational force	a) Resolving horizontally. You had to use $g = 9.8!$ b) Resolving vertically. $s = ut + \frac{1}{2}AT^2$ and sub in T from a) c) use $v^2 - u^2 = 2as$, with $v = 0$ and $\tan(\theta) = 3/4$ Using 9.81 would not work as it would not cancel out $49/50$	2 5 3 1

d) Explain why the model might not be suitable	Dimensions and weight of the particle		
6) Ladders a. Which direction is friction acting b. Show that $\frac{1}{2} Mg \cot(\theta) = T$ c. Find μ	a. To the right because the ladder is on the point of slipping to the left b. Show that $\frac{1}{2} Mg \cot(\theta) = T$ c. $\mu = \frac{2}{3}$ d. $(\sqrt{13})/3 Mg$ (Resultant force at B would be larger as $Mg \cos \theta$ would have a bigger value etc.) e. resultant force at B would be larger because the perpendicular force would be greater if the centre of mass moved further away	For this question. The moments and Net forces are 0. Using this idea, equate and solve. For the last bit, just formulate an equation, the distance of the mass's act will be larger, and then solve for reaction force, numerator will be larger and hence Normal force is larger.	1 2 5 3 1

	from B as $\tan(a)$ stays the same	Not doing all that for 1 mark ok	
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Statistics

Question	Answer	Comments	Marks
1) Probability a. $P(A)$ b. Find p and q c. Find $P(A B')$	a. 0.38 b. $p = 0.2, q = 0.07$ c. 0.325	$P(B) * P(C) = P(B \cap C)$	1 2 3

<p>2) Binomial Distribution</p> <p>a. Assumptions for binomial model to be suitable</p> <p>b. Find $P(T=6)$</p> <p>c. Find $P(T<3)$</p> <p>d. Probability that exactly 2 boxes have $P(T<3)$</p> <p>e. Hypothesis test for claim that $p<1/7$</p> <p>f. What is the value of p</p>	<p>a. Each packet of sweets is independent, the probability of a packet of sweets having a prize in it is fixed</p> <p>b. 0.173</p> <p>c. $P(X\leq 2) = 0.0615$</p> <p>d. 0.158</p> <p>e. $X\sim(110, 0.0312)$ Reject null for hypothesis</p> <p>f. Double the probability in the tail calculated, $0.028 \times 2 = 0.056$</p>	<p>The type of Question this question was that if there were x trials and if the probability for the even was 'r', what is the probability for the event to occur 'a' to 'b' times.</p> <p>The probability occurring an 'n'th time would be $(x \text{C } n)(r^n)(1-r)^{(x-n)}$ and then form a series while simplifying/factorise the summations which makes typing into calculator easier or just use the binomial calculator in the statistics part.</p>	<p>1 3 3</p>
<p>3) Large Data Set</p> <p>a.</p>	<p>a. Treat tr as 0.025mm (0mm is also accepted) Change to continuous</p> <p>b. Mean = 2.12, SD = 4.37</p> <p>c. The Large Data set only ranges from May-Oct 1987</p> <p>d. Question of how would the actual mean would differ?</p> <p>Therefore these 6 months are not an accurate measure of the annual mean daily rainfall</p>	<p>(Alternative reason: The 1987 storm, [I put this] I don't think you can suggest the storm as that mainly affected the South God damn it i put 0.05</p>	<p>2 3 1</p>

<p>4) Normal Distribution</p>	<p> $H_0: \mu = 175.4$ $H_1: \mu \neq 175.4$ $P(\bar{A} > 177.5) = 0.028$ Or $H_0: \mu = 177.5$ $H_1: \mu \neq 177.5$ $P(\bar{A} < 175.4) = 0.028$ $0.028 > 0.025$ so insufficient evidence to reject H_0. No reason to believe mean height of men at destination B is not = 175.4 </p>	<p> I swear this was a one tail test Dont remember the values someone correct pls xx It was two tailed it said the probability was different Also was this the p-value question? Yes this was the p value, just double the probability to get total probability as it's a two tailed test. P was something like 0.058 </p>	<p>4</p>
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<p>5) Probability Distribution</p>	<p>a. $bk/50 = ck/80$ as probability is the same. Rearranging to get $c = 8/5b$</p> <p>b. $a=2/25$, $b=\frac{1}{5}$, $c=8/25$, $d=\frac{1}{5}$</p> <p>c. Nav got the probability of success being 0.3, but table shows $d = 0.4$ hence model isn't suitable</p>	<p>Use this equation (bayes formula) and given probabilities to get</p> <p>For part a I said $80/50 = c/b$ So $c = 85/b$ and then for part 2 I did that for all of them and got them in terms of b, all terms of b add to 1 so $b=0.2$ and then you substitute that into your equations. Gave me the same answer.</p> <p>$P(\{X=x\} \cap S) =$</p> <p>$P(X=x)P(S \{X=x\})$</p> <p>Use bayes formula and just repeat it all the time for a linear combination of a variable in all other variables, for example:</p> <p>$a=x_1c$, ..., $d=x_4c$ and then sum probs to 1 and sub in c, and solve for c and then using value of c, find all the other elements's prob.</p> <p>$P(A \cap B) = P(A B)P(B) = P(B A)P(A)$</p> <p>Probability theory, its a basic formula.</p> <p>I didnt use bayes formula, i so its possible without, i just used the conditional probability formula (the regular ass one)</p>	<p>2</p> <p>5</p> <p>1</p>
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<p>6) Frequency polygons and histograms</p>	<p>a) 48.4/90</p> <p>b) Normal distribution not appropriate as the distribution is not uniform</p> <p>c) $[1-(1+x)e^{-n}]$</p> <p>d) Show $K=99$ to nearest integer (99.07)</p> <p>ei) 0.6486</p> <p>eii) $P(\text{Xiang's model}) = 0.59027$</p> <p>Limitation of the model</p> <ul style="list-style-type: none"> • Xiang's model is only valid $0 \leq n \leq 4$ 	<p>Remember that</p> <p>$1n = 10 \text{ Hours.}$</p> <p>K was 1 right</p> <p>Integration by parts</p> <p>Lol I didn't see this question the back page</p> <p>low IQ moment.</p> <p>Good. if you had not got 0.59, then that would be weird. Because the integral from 1 to 3 is equal to integral of 0 to 3 minus the integral of 0 to 1 then divide by 90.</p> <p>I just used my calculator to get a decimal for the integral</p> <p>😊</p> <p>Valid way too. I did it in closed form (linear combination of powers of 'e' and</p>	<p>19</p>
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