Questions taken from the WJEC SAMS Applied Paper

1(a)	$P(A \cup B) = P(A) + P(B)$ $= 0.2 + 0.3 = 0.5$	M1 A1
(b)	$P(A \cup B) = P(A) + P(B) - P(A \cap B)$ $= P(A) + P(B) - P(A)P(B)$ $= 0.2 + 0.3 - 0.06 = 0.44$	M1 A1 A1

2(a)	$H_0 : p = 0.45 : H_1 : p < 0.45$	B1
(b)(i)	Under H_0, X is B(60,0.45). Sig level = $P(X \leq 20)$ $= 0.0446$	B1 M1 A1

6.	(a)	$v^2 = u^2 + 2as$, $u=0$, $a=9.8$, $s=160$ $v^2 = 2 \times 9.8 \times 160$ $v = 56\ (\text{ms}^{-1})$	M1 A1 A1
	(b)	$s = ut + 0.5at^2$, $u=0$, $a=9.8$, $s=160$ $160 = 0.5 \times 9.8 \times t^2$ $t = \frac{40}{7}\ (\text{s})$	M1 A1 A1
	(c)	Object modelled as particle. Air resistance/external forces apart from gravity all ignored.	B1 [7]

10.

Resultant force vector $= \mathbf{F} + \mathbf{G}$
$= (\mathbf{i} - 8\mathbf{j}) + (3\mathbf{i} + 11\mathbf{j})$
$= 4\mathbf{i} + 3\mathbf{j}$ B1

Magnitude of force $= \sqrt{4^2 + 3^2}$ M1
$= 5$ (N) A1

Use $F = ma$ M1

mag. of acceleration $= \frac{5}{3}(\text{ms}^{-2})$ A1

Let θ be angle direction of motion makes with the vector **i**.

$\tan\theta = \frac{3}{4}$ M1

$\theta = 36.87°$ A1

Alternative solution

Resultant force vector $= \mathbf{F} + \mathbf{G}$

$= (\mathbf{i} - 8\mathbf{j}) + (3\mathbf{i} + 11\mathbf{j})$
$= 4\mathbf{i} + 3\mathbf{j}$ (B1)

Use $\mathbf{F} = m\mathbf{a}$ (M1)
$4\mathbf{i} + 3\mathbf{j} = 3\mathbf{a}$
$\mathbf{a} = \frac{4}{3}\mathbf{i} + \mathbf{j}$ (A1)

$\text{mag } \mathbf{a} = \sqrt{\left(\frac{4}{3}\right)^2 + 1}$ (M1)

$\text{mag } \mathbf{a} = \frac{5}{3}(\text{ms}^{-2})$ (A1)

$\text{Direction} = \tan^{-1}\left(\frac{3}{4}\right)$ (M1)

$= 36.87°$ (A1)

[7]

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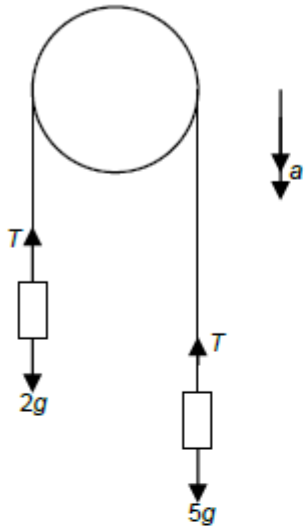
(b)	Close the gaps between the bars as length of single is a continuous variable	B1
	Correct the width of column 3.0–4.0	B1

7.	(a)		
		Apply N2L to one particle $5g - T = 5a$	M1 A1
		Apply N2L to other particle $T - 2g = 2a$ $3g = 7a$ $a = 4.2$ (ms^{-1}) $T = 28$ (N)	A1 m1 A1 A1
	(b)	Light string enables me to assume tension is constant throughout the string.	E1
			[7]