

**Activity 4 - Questions and mark schemes**

<p>5. (a) Find, using algebra, all real solutions of</p> $2x^3 + 3x^2 - 35x = 0$ <p style="text-align: right;">(3)</p> <p>(b) Hence find all real solutions of</p> $2(y - 5)^6 + 3(y - 5)^4 - 35(y - 5)^2 = 0$ <p style="text-align: right;">(4)</p>	Let bla
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Question Number	Scheme	Marks
5.(a)	$2x^3 + 3x^2 - 35x = 0 \Rightarrow x(2x^2 + 3x - 35) = 0$ $(2x - 7)(x + 5) = 0 \Rightarrow x = \dots$ $x = -5, 0, \frac{7}{2}$	M1 dM1 A1 (3)
(b)	$2(y - 5)^6 + 3(y - 5)^4 - 35(y - 5)^2 = 0$ States that $y = 5$ is a solution $(y - 5)^2 = \frac{7}{2} \Rightarrow y = \dots$ $y = 5 + \sqrt{\frac{7}{2}}$ or $y = 5 - \sqrt{\frac{7}{2}}$ or exact equivalent Both $y = 5 + \sqrt{\frac{7}{2}}$ and $y = 5 - \sqrt{\frac{7}{2}}$ or exact equivalent.	B1 M1 A1ft A1 (4) (7 marks)

2.

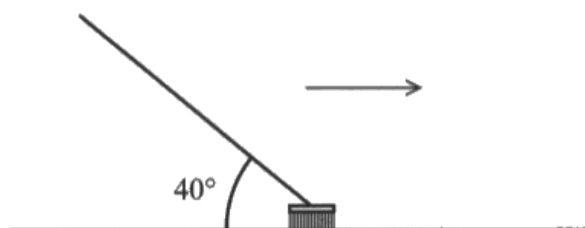
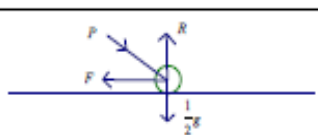


Figure 1

A broom is being used to sweep a rough horizontal floor. The handle of the broom makes a constant angle of  $40^\circ$  with the horizontal, as shown in Figure 1. The broom head is modelled as a particle of mass  $0.5 \text{ kg}$  and the handle of the broom is modelled as a light rod. The coefficient of friction between the broom head and the floor is  $\frac{1}{4}$ . The broom head is pushed along the floor in a straight line at constant speed. Find the magnitude of the force that is being applied along the handle of the broom to the broom head.

(6)

Question Number	Scheme	Marks	Notes
2.			Condone if $P$ acting in the wrong direction but see SC below
	$F = \frac{1}{4}R$	B1	Use of $F = \mu R$ with $\mu = \frac{1}{4}$ seen or implied
	$P \cos 40 = F$	B1	Resolve horizontally. Accept $F \cos 40^\circ = F_{\text{res}}$ . Not $F \cos 40^\circ = F$
	Resolve vertically	M1	All terms required, and dimensionally correct. $P \neq R$ Condone sign errors and sin/cos confusion
	$P \sin 40 + 0.5g = R$	A1	Correct unsimplified equation
	$P(4 \cos 40 - \sin 40) = 0.5g$	DM1	Substitute for $R$ and solve for $P$ . Requires zero acceleration. Dependent on previous M1
	$P = 2.0 \text{ (N)}$ or $2.02 \text{ (N)}$	A1	2 or 3 sf only
		(6)	SC if $F$ opposes their $P$ , 6/6 available If $P$ and $F$ inconsistent max score available B1B0 M1A1 follow their diagram DM1A0