

Changing the Subject of the Formula Mark Scheme

Level	IGCSE
Subject	Maths
Exam Board	Edexcel
Topic	Equations, Formulae and Identities
Sub Topic	Changing the subject of the formula (Algebraic manipulation)
Booklet	Mark Scheme

Time Allowed: 46 minutes

Score: /38

Percentage: /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	75%	70%	60%	55%	50%	<50%

Question	Working	Answer	Mark	Notes
1.	$3y + 6x - 3 = x + 5y$ $5x - 3 = 2y$ oe	$(5x - 3)/2$	3	M1 Multiplying out brackets. M1 dep Correctly collecting like terms, (3 terms needed here). A1 oe
				Total 3 marks

2.	$\frac{A}{2\pi r} = r + h$ or $A = 2\pi r^2 + 2\pi r h$	$\frac{A}{2\pi r} - r = h$ oe	2	M1 Correct first step A1 e.g. $\frac{A - 2\pi r^2}{2\pi r}$ Give full credit to equivalent correct expressions
				Total 2 marks

3.	$t^2 = \frac{3}{n}$ $nt^2 = n + 3$ $nt^2 - n = 3$ $n(t^2 - 1) = 3$	$n = \frac{3}{t^2 - 1}$	4	M1 squaring both sides M1 isolating terms in n M1 factorising A1 or $n = \frac{3}{(t+1)(t-1)}$ or $n = \frac{-3}{1-t^2}$ or $n = \frac{-3}{(1-t)(1+t)}$
				Total 4 marks

Question	Working	Answer	Mark	Notes
4.	$y^2 = ay^2 + n$		5	M1
	$y^2 - ay^2 = n$ or $1 = a + \frac{n}{y^2}$ or $1 - a = \frac{n}{y^2}$			M1 isolate terms in y^2 or divide through by y^2
	$y^2(1 - a) = n$			M1 take out y^2 as a common factor
	$y^2 = \frac{n}{1 - a}$			M1 y^2 as subject
		$\sqrt{\frac{n}{1 - a}}$		A1 accept $\sqrt{\frac{-n}{a - 1}}$
Total 5 marks				

Question	Working	Answer	Mark	Notes
5.	$A = (4 - \pi)r^2$ or $\frac{A}{r^2} = 4 - \pi$		3	M1
	$r^2 = \frac{A}{4 - \pi}$			M1 for isolating r^2
		$\sqrt{\frac{A}{4 - \pi}}$		A1 Also accept $\pm \sqrt{\frac{A}{4 - \pi}}$
Total 3 marks				

Question	Working	Answer	Mark	Notes
6.	$y^2 = \frac{2x+1}{x-1}$ $y^2(x-1) = 2x+1$ $y^2x - y^2 = 2x+1$ $y^2x - 2x = y^2 + 1$	$x = \frac{y^2+1}{y^2-2} \text{ oe}$	4	M1 squaring both sides to get a correct equation M1 removing denominator to get a correct equation M1 correctly gathering xs on one side of a correct equation with non x terms on the other side A1
				Total 4 marks

Question	Working	Answer	Mark	Notes
7. (a)				M1 $(2t \pm 1)(t \pm 3)$ or $(2t \pm 3)(t \pm 1)$ NB. Accept $1t$ in place of t
		$(2t-1)(t-3)$	2	A1 cao
(b)	$bx^2 = a - y \text{ or } -bx^2 = y - a$			M1 for isolating bx^2 (or $-bx^2$)
	$x^2 = \frac{a-y}{b} \text{ or } x^2 = \frac{y-a}{-b} \text{ or } x^2 = -\frac{y-a}{b}$			M1 for isolating x^2
		$x = \pm \sqrt{\frac{a-y}{b}}$	3	A1 or $x = \pm \sqrt{\frac{y-a}{-b}}$ or $x = \pm \sqrt{-\frac{y-a}{b}}$ (condone omission of \pm)
				Total 5 marks

8.	$\frac{A}{4\pi} = r^2$		2	M1
		$\sqrt{\frac{A}{4\pi}}$		A1 accept equivalents eg. $\frac{\sqrt{A\pi}}{2\pi}$, $\frac{1}{2}\sqrt{\frac{A}{\pi}}$
				Total 2 marks

9.	$5t - 5g = 2t + 7$			M1	for expanding bracket within the equation or division of all terms by 5
	$5t - 2t = 7 + 5g$			M1	(ft a 4 term equation) to isolate terms in t
		$t = \frac{5g+7}{3}$	3	A	oe
					Total 3 marks

10.	$4g - 9eg = 7 - 3e$ or $3e - 7 = 9eg - 4g$			M1	Correctly collecting terms in g on one side and everything else on the other.
	$g(4 - 9e) = 7 - 3e$ or $3e - 7 = g(9e - 4)$			M1	Factorising $g(4-9e)$ or $g(9e-4)$
		$g = \frac{7-3e}{4-9e}$ or $g = \frac{3e-7}{9e-4}$	3	A1	
					Total 3 marks

11.	$m(t - 3) = t + 1$ or $mt - 3m = t + 1$		4	M1 clearing fraction
	e.g. $mt - t = 1 + 3m$ or $t - mt = -1 - 3m$			M1 for expanding bracket AND rearranging so that all terms in t are isolated on one side of a correct equation
	$t(m - 1)$ or $t(1 - m)$			M1 take t out as a common factor (in an equation)
		$t = \frac{3m + 1}{m - 1}$		A1 or $t = \frac{-3m - 1}{1 - m}$ oe
				Total 4 marks