



3.14H Solving Equations: Higher Tier Practice

EDEXCEL Edexcel 1MA1 · Calculator allowed · about 75 minutes

Total Marks

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

1 Solve $5x - 7 = 3x + 9$.

(Total for Question 1 is 2 marks)

2 Solve $3(2y - 1) = 4y + 5$.

(Total for Question 2 is 3 marks)

3 Solve the equation $(2x + 3)/4 = x - 1$.

(Total for Question 3 is 4 marks)

4 Show that the equation $3x^2 - 5x - 2 = 0$ has solutions $x = 2$ and $x = -1/3$. Then factorise $3x^2 - 5x - 2$ fully.

(a) Show that $x = 2$ and $x = -1/3$ are solutions. (2)

(b) Factorise $3x^2 - 5x - 2$. (3)

(Total for Question 4 is 5 marks)

5 Solve the simultaneous equations

$$2u + 3v = 7$$

$$5u - v = 6$$

(a) Eliminate v and find u . (3)

(b) Find v using your value of u . (3)

(Total for Question 5 is 6 marks)

6 Solve the equation $4/(x - 2) + 1 = 3/(x - 2)$. State any values of x that are not allowed.

(a) Solve for x . (3)

.....
(b) State any values of x not allowed and why. (3)

(Total for Question 6 is 6 marks)

7 Solve the equation $2(3 - t) = t^2 - 5t + 6$. Show all steps and give exact answers.

(a) Rearrange the equation to write it in the form $f(t) = 0$. (3)

(b) Factorise and solve the equation fully, giving exact values of t . (3)

.....
(c) Check whether both roots satisfy the original equation and state your conclusion. (1)

(Total for Question 7 is 7 marks)

Mark scheme · 3.14H Solving Equations: Higher Tier Practice

Question 1

- **M1** collect like terms, e.g. $5x - 3x = 9 + 7$ or equivalent method
- **A1** $x = 8$ cao
- **Answer: 8**

Question 2

- **M1** expand and collect terms, $6y - 3 = 4y + 5$ or equivalent
- **M1** isolate y , $6y - 4y = 5 + 3$
- **A1** $y = 4$ cao
- **Answer: 4**

Question 3

- **M1** multiply both sides by 4 or equivalent method, $2x + 3 = 4x - 4$
- **M1** collect like terms, $3 + 4 = 4x - 2x$
- **A1** $x = 7/2$ cao
- **B1** allow either fraction or decimal form $7/2$ or 3.5
- **Answer: $7/2$ or 3.5**

Question 4

- (a) **M1** substitute $x = 2$ and $x = -1/3$ into $3x^2 - 5x - 2$ and show each gives 0
- (a) **A1** both substitutions give 0 cao
- (a) **Answer: Substituting $x=2$ gives $3(4)-10-2=12-12=0$; substituting $x=-1/3$ gives $3(1/9)-5(-1/3)-2 = 1/3+5/3-2 = 6/3-2 = 2-2 = 0$**
- (b) **M1** use roots to write factors or perform factorisation to $(x - 2)(3x + 1)$ or equivalent
- (b) **A1** $3x^2 - 5x - 2 = (x - 2)(3x + 1)$ cao
- (b) **B1** expand to check or state factors correctly
- (b) **Answer: $(x - 2)(3x + 1)$**

Question 5

- (a) **M1** multiply second equation by 3 and add to first to eliminate v or equivalent
- (a) **M1** compute resulting equation, $2u + 3v + 15u - 3v = 7 + 18$
- (a) **A1** $u = 25/17$ cao
- (a) **Answer: $u = 25/17$**
- (b) **M1** substitute u into one equation, e.g. $5u - v = 6$
- (b) **M1** calculate $v = 5u - 6$ with $u = 25/17$ leading to $v = 125/17 - 102/17$
- (b) **A1** $v = 23/17$ cao
- (b) **Answer: $v = 23/17$**

Question 6

- (a) **M1** subtract $3/(x-2)$ from both sides or combine fractions over common denominator
- (a) **M1** get $4/(x-2) - 3/(x-2) + 1 = 0$ leading to $1/(x-2) + 1 = 0$
- (a) **A1** $x = 1$ cao
- (a) **Answer: $x = 1$**
- (b) **B1** identify $x = 2$ is not allowed because denominator $x - 2 = 0$
- (b) **B1** state that $x = 2$ would make left and right expressions undefined
- (b) **A1** $x = 2$ not allowed cao
- (b) **Answer: $x = 2$ is not allowed because it makes the denominator zero.**

Question 7

- (a) **M1** expand both sides or expand left-hand side: $6 - 2t = t^2 - 5t + 6$
- (a) **M1** collect all terms on one side, e.g. $0 = t^2 - 3t$ or equivalent
- (a) **A1** clear statement $t^2 - 3t = 0$ cao
- **(a) Answer: $t^2 - 3t = 0$**
- (b) **M1** factorise the quadratic to $t(t - 3)$ or equivalent
- (b) **M1** use zero product principle to obtain candidate roots $t = 0$ or $t = 3$
- (b) **A1** exact solutions $t = 0$ and $t = 3$ cao
- **(b) Answer: $t = 0$ and $t = 3$**
- (c) **B1** both roots $t = 0$ and $t = 3$ satisfy the original equation (both give equality) oe
- **(c) Answer: Both $t = 0$ and $t = 3$ satisfy the original equation.**