2.14 Introduction to Factorising Quadratics: Test Pack

Calculators not allowed · about 65 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Factorise the quadratic expression fully: $x^2 + 5x + 6$

(1)

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2 Factorise $x^2 + 6x + 5$ and use the factorised form to solve $x^2 + 6x + 5 = 0$

(3)

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3 Factorise $x^2 + 11x + 30$ and hence find the values of x for which the expression equals zero.

(3)

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4 Expand $(x + 4)(x - 1)$ to form a quadratic. Then find all x such that this quadratic equals 6.

(4)

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5 The product of two consecutive integers is 56. Let the smaller integer be x. (a) Write an equation in x. (b) Solve the equation to find the positive integer.

(5)

6 Given $f(x) = x^2 + 15x + 56$.

(a) Factorise f(x) fully. **(2)**

(b) Find f(-10). **(2)**

7 Show that $x^2 + 6x + 9$ can be written as $(x + 3)^2$. Use this to explain why $x^2 + 6x + 9$ is never negative for any real x. Give the value(s) of x for which the expression equals 0.

(6)

8 Expand and simplify (p + 8)(p - 8).

(2)

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9 Factorise $x^2 - 9x$.

(2)

10 Expand and simplify $(3p + 9)(p - 1)$.

(3)

11 Factorise $p^2 - 36$.

(2)

12 Expand and simplify $(n + 7)(n + 7)$.

(3)

13 Show that $n^2 + 8n + 15$ can be written as $(n + 3)(n + 5)$.

(3)

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14 Multiply out $(x + 5)(x - 2)$ and then factorise your answer to show you get back the original factors.

(2)

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15 Given that $f(x) = x^2 + 19x + 90$:

(a) factorise f(x) fully

(b) find f(-12).

(3)

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16 Factorise $x^2 + 8x + 7$ and use the factorised form to solve $x^2 + 8x + 7 = 0$

(3)

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Mark scheme · 2.14 Introduction to Factorising Quadratics: Test Pack

Question 1

Correct factorisation $(x + 2)(x + 3)$ cao	B1

Answer: **$(x + 2)(x + 3)$**

Question 2

Correct factorisation $(x + 1)(x + 5)$ or equivalent	M1
Set each factor to zero: $x + 1 = 0$, $x + 5 = 0$	A1
Correct solutions $x = -1$ and $x = -5$ cao	A1

Answer: **$x = -1$, $x = -5$**

Question 3

Factorise correctly as $(x + 5)(x + 6)$ or equivalent	M1
Set each factor to zero method shown	A1
Correct roots $x = -5$ and $x = -6$ cao	A1

Answer: **$x = -5$, $x = -6$**

Question 4

Correct expansion $x^2 + 3x - 4$	M1
Move 6 to make equation $x^2 + 3x - 10 = 0$	M1
Correct factorisation $(x + 5)(x - 2)$ or equivalent	M1
Correct solutions $x = -5$ and $x = 2$ cao	A1

Answer: **$x = -5$, $x = 2$**

Question 5

Correct equation $x(x + 1) = 56$ or equivalent shown	M1
Rearrange to $x^2 + x - 56 = 0$	M1
Correct factorisation $(x + 8)(x - 7)$ or equivalent	M1
Correct solutions $x = 7$ and $x = -8$	A1
State positive integer is 7 cao	A1

Answer: **7**

Question 6

(a) Identify two numbers multiply to 56 and add to 15	M1
(a) Correct factorisation $(x + 7)(x + 8)$ cao	A1
(a) Answer: **$(x + 7)(x + 8)$**	
(b) Substitute -10 into $x^2 + 15x + 56$ and evaluate method shown	M1
(b) Correct value $f(-10) = 6$ cao	A1
(b) Answer: **6**	

Question 7

Complete the square or expand $(x + 3)^2$ showing $x^2 + 6x + 9$	M1
State the identity $x^2 + 6x + 9 = (x + 3)^2$ explicitly	M1
Explain that a square is always ≥ 0, so $(x + 3)^2 \geq 0$ for all real x	A1
Conclude that $x^2 + 6x + 9$ is never negative by following from the square property	M1
State that the minimum value is 0 and it occurs when $x + 3 = 0$	A1
Give the value $x = -3$ for which the expression equals 0 cao	A1

Answer: **$x = -3$**

Question 8

all products attempted, at least three correct	M1
$p^2 - 64$ cao	A1

Answer: **$p^2 - 64$**

Question 9

a correct factor taken out or a correct bracket	M1
$x(x - 9)$ oe cao	A1

Answer: **$x(x - 9)$**

Question 10

at least three of the four products correct	M1
all four products correct	M1
$3p^2 + 6p - 9$ cao	A1

Answer: **$3p^2 + 6p - 9$**

Question 11

a correct factor taken out or a correct bracket	M1
$(p + 6)(p - 6)$ oe cao	A1

Answer: **$(p + 6)(p - 6)$**

Question 12

at least three of the four products correct	M1
all four products correct	M1
$n^2 + 14n + 49$ cao	A1

Answer: **$n^2 + 14n + 49$**

Question 13

expands $(n + 3)(n + 5)$ with at least three terms correct	M1
$n^2 + 3n + 5n + 15$ shown	M1
$n^2 + 8n + 15$ shown (with $3n + 5n = 8n$)	A1

Answer: **$n^2 + 8n + 15$ (shown)**

Question 14

Correct expansion $x^2 + 3x - 10$	M1
Correct factorisation back to $(x + 5)(x - 2)$ cao	A1

Answer: **Expansion: $x^2 + 3x - 10$; Factorised: $(x + 5)(x - 2)$**

Question 15

correct pair of factors of 90 that sum to 19 identified	M1
$(x + 9)(x + 10)$ cao	A1
$f(-12) = 6$ cao (ft their factorised form or by direct substitution)	B1

Answer: **$(x + 9)(x + 10)$; $f(-12) = 6$**

Question 16

correct pair of factors of 7 that sum to 8 identified	M1
$(x + 1)(x + 7)$ cao	A1
$x = -1$ and $x = -7$	B1

Answer: **$(x + 1)(x + 7)$; $x = -1$ or $x = -7$**

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