Solving Quadratics Using Factorisation Exam Practice

Q1. a) Factorise: $x^2 + 2x - 15$

$(x+5)(x-3)$

Answer: $(x+5)(x-3)$

(2 marks)

b) Hence solve the equation: $x^2 + 2x - 15 = 0$

$(x+5)(x-3)=0$

$x=3, -5$

Answer: $3, -5$

(2 marks)

Q2. a) Factorise: $x^2 - 11x + 24$

$(x-8)(x-3)$

Answer: $(x-8)(x-3)$

(2 marks)

b) Hence solve the equation: $x^2 - 11x + 24 = 0$

$(x-8)(x-3)=0$

$x=8, 3$

Answer: $8, 3$

(2 marks)

Q3. Factorise the following quadratics:

a) $a^2 - 2a - 35$

$(a+5)(a-7)$

Answer: $(a+5)(a-7)$

(2 marks)

b) $b^2 - 64$

$(b-8)(b+8)$

Answer: $(b-8)(b+8)$

(2 marks)

Q4. a) Factorise: $c^2 + 17c + 60$

$(c+12)(c+5)$

Answer: $(c+12)(c+5)$

(2 marks)

b) Hence solve the equation: $c^2 + 17c + 60 = 0$

$(c+12)(c+5) = 0$

$c = -12, -5$

Answer: $-12, -5$

(2 marks)

Q5. Solve the following equation:

$x^2 + 11x = 42$

$x^2 + 11x - 42 = 0$

$(x + 14)(x - 3) = 0$

$x = -14, 3$

Answer: $-14, 3$

(3 marks)

Q6. Solve the following equation:

$y^2 - 14y = -48$

$y^2 - 14y + 48 = 0$

$(y - 8)(y - 6) = 0$

$y = 8, 6$

Answer: $6, 8$

(3 marks)

Q7. Solve the following equation:

$a^2 = -14a + 72$

$a^2 + 14a - 72 = 0$

$(a + 18)(a - 4) = 0$

$a = -18, 4$

Answer: 4, −18

(3 marks)

Q8. Show that the equation $x - \frac{54}{x} = 3$ can be written in the form:

a) $x^2 - 3x - 54 = 0$

$x - \frac{54}{x} = 3$

$x - 3 = \frac{54}{x}$

$x(x - 3) = 54$

$x^2 - 3x = 54$

$x^2 - 3x - 54 = 0$

Answer:

(2 marks)

b) Hence solve the equation: $x - \frac{54}{x} = 3$

$x^2 - 3x - 54 = 0$

$(x + 6)(x - 9) = 0$

$x = -6, 9$

Answer: −6, 9

(2 marks)

Applied Mixed Practice Problems

Q10. The height h of a ball above the ground in metres, t seconds after it is thrown, is given by the equation, $h = -t^2 + 8t$.
Find the times when the ball is 7m above the ground.

$7 = -t^2 + 8t$

$t^2 - 8t + 7 = 0$

$(t-1)(t-7) = 0$

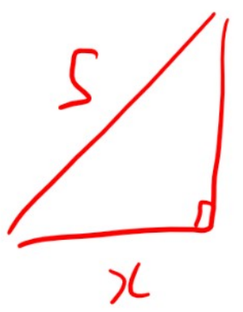
$t = 1, 7$

Answer: 1, 7 seconds

(3 marks)

Q11. The sides of a right-angled triangle are $5, x$ and $x + 1$.
a) You are given that 5 is the hypotenuse. Show that $x^2 + x - 12 = 0$.

Pythagoras: $x^2 + (x+1)^2 = 5^2$



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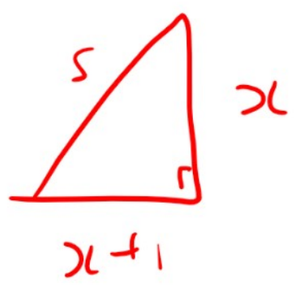


$x^2 + x^2 + 2x + 1 = 25$

$(\div 2)\quad 2x^2 + 2x - 24 = 0\quad (\div 2)$

$x^2 + x - 12 = 0$

Answer: _____

(4 marks)

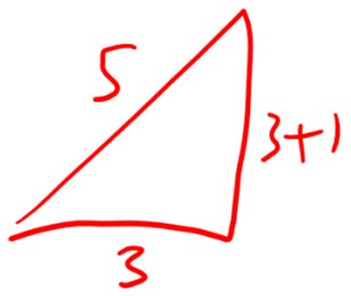
b) Find the perimeter of the triangle.

$x^2 + x - 12 = 0$

$(x+4)(x-3) = 0$

$x = -4, 3$

$\times$ rejected.

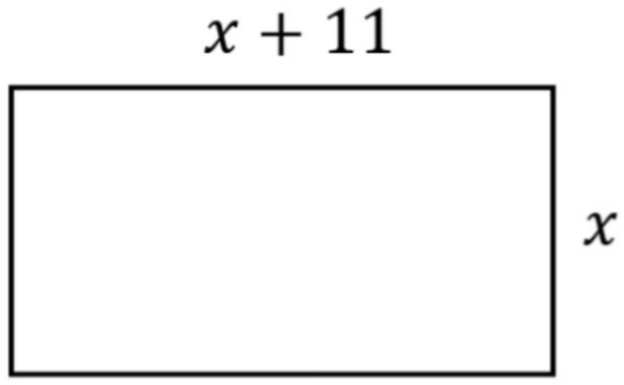


$\Rightarrow$ perimeter is $3+4+5 = 12$

Answer: 12

(2 marks)

Q12. The area of the rectangle below is 42 cm^2. By finding and solving a suitable quadratic equation, work out the dimensions of the rectangle.



$x(x+11) = 42$

$x^2 + 11x = 42$

$x^2 + 11x - 42 = 0$

$(x + 14)(x - 3) = 0$

$x = -14, 3$

reject

3 + 11

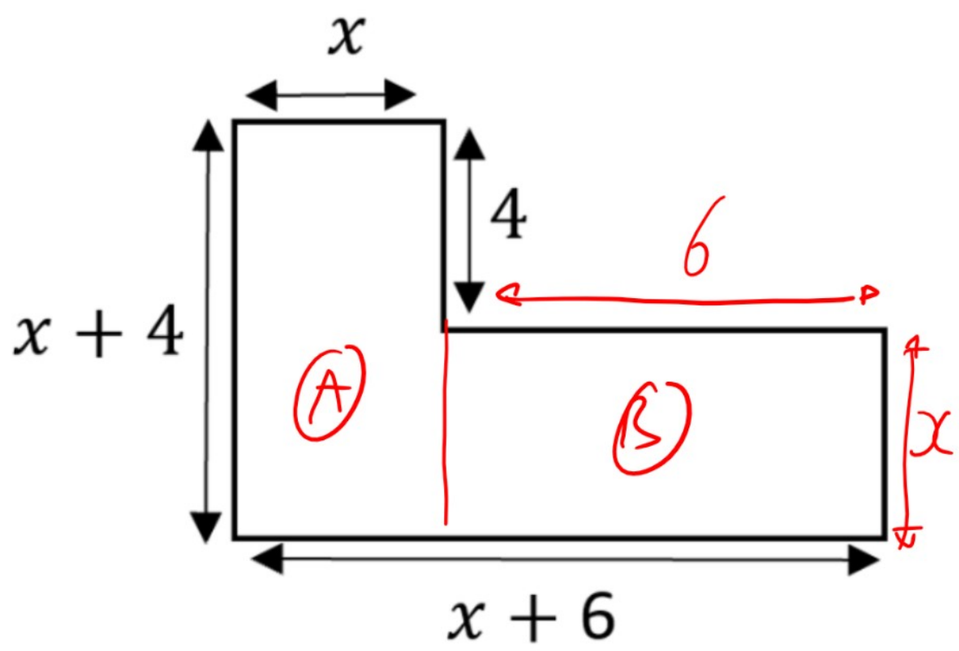
3

3 by 14 (or 14 by 3)

Answer: 3 by 14

(4 marks)

Q13. The area of the shape below is 39 cm^2.



a) Show that $x^2 + 10x - 39 = 0$

A : $x(x+4)$ B $6x$

$x^2+4x+6x = 39$

$x^2+10x = 39$

$x^2+10x-39=0$

Answer: _____

(3 marks)

b) Find the perimeter of the shape.

$x^2+10x-39=0$

$(x+13)(x-3)=0$

$x=-13, 3$

reject

perimeter $= x+x+4+x+6+x+6+4$

$= 4x+20$

at $x=3$, perimeter $= 32$

Answer: 32cm

(3 marks)

Q14. Usma is thinking of a positive number. Sally writes down what she gets when squares Usma's number. Hari writes down what she gets when she multiplies Usma's number by 4. Finally Usma adds Sally's and Hari's numbers together and gets 12.
By setting up and solving a suitable quadratic equation, work out what Usma's number is.

let x = Usma's number

Sally: x^2

Hari: $4x$

$$x^2 + 4x = 12$$

$$x^2 + 4x - 12 = 0$$

$$(x+6)(x-2) = 0$$

$$x = -6, 2$$

↓

reject

$x = 2$

Answer: 2

(4 marks)