W3 – Factor $x^2 + bx + c$ Unit 3

MPM2D

Jensen

1) Factor, if possible.

a) $x^2 + 7x + 10$

$2 \times 5 = 10$

$2 + 5 = 7$

$= (x+2)(x+5)$

b) $j^2 + 12j + 27$

$9 \times 3 = 27$

$9 + 3 = 12$

$= (j+9)(j+3)$

c) $k^2 + 5k + 4$

$4 \times 1 = 4$

$4 + 1 = 5$

$= (k+4)(k+1)$

d) $p^2 + 9p + 12$

$\_\_ \times \_\_ = 12$

$\_\_ + \_\_ = 9$

not factorable

e) $w^2 + 11w + 25$

$\_\_ \times \_\_ = 25$

$\_\_ + \_\_ = 11$

not factorable

f) $d^2 + 10d + 24$

$6 \times 4 = 24$

$6 + 4 = 10$

$= (d+6)(d+4)$

2) Factor, if possible.

a) $m^2 - 7m + 10$

$-2 \times -5 = 10$

$-2 + -5 = -7$

$= (m-2)(m-5)$

b) $x^2 - 5x + 7$

$\_\_ \times \_\_ = 7$

$\_\_ + \_\_ = -5$

not factorable

c) $y^2 - 5y + 4$

$-4 \times -1 = 4$

$-4 + -1 = -5$

$= (y-4)(y-1)$

d) $r^2 - 16r + 64$

$-8 \times -8 = 64$

$-8 + -8 = -16$

$= (r-8)(r-8)$

$= (r-8)^2$

e) $w^2 - 9w + 24$

$\_\_ \times \_\_ = 24$

$\_\_ + \_\_ = -9$

NOT factorable

f) $q^2 - 10q + 9$

$-9 \times -1 = 9$

$-9 + -1 = -10$

$= (q-9)(q-1)$

3) Factor, if possible.

a) $a^2 - 3a - 10$

$-5 \times 2 = -10$

$-5 + 2 = -3$

$= (a-5)(a+2)$

b) $s^2 + 3s - 10$

$5 \times -2 = -10$

$5 + -2 = 3$

$= (s+5)(s-2)$

c) $d^2 - 8d - 9$

$-9 \times 1 = -9$

$-9 + 1 = -8$

$= (d-9)(d+1)$

d) $f^2 + 7f - 6$

___ × ___ = -6
___ + ___ = 7

not factorable

e) $g^2 - 5g - 14$

-7 × 2 = -14
-7 + 2 = -5

$= (g-7)(g+2)$

f) $r^2 + 2r - 6$

___ × ___ = -6
___ + ___ = 2

not factorable

g) $x^2 + x - 42$

7 × -6 = -42
7 + -6 = 1

$= (x+7)(x-6)$

h) $b^2 - 2b - 4$

___ × ___ = -4
___ + ___ = -2

not factorable

i) $x^2 + xy - 42y^2$

7 × -6 = -42
7 + -6 = 1

$= (x+7y)(x-6y)$

j) $x^2 - 8xy - 48y^2$

-12 × 4 = -48
-12 + 4 = -8

$= (x - 12y)(x + 4y)$

k) $x^4 + 11x^2 + 24$

Let $k = x^2$

$= k^2 + 11k + 24$

$= (k+8)(k+3)$

$= (x^2+8)(x^2+3)$

8 × 3 = 24
8 + 3 = 11

l) $x^2 - 9$

3 × -3 = -9
3 + -3 = 0

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

4) Factor, if possible.

a) $3x^2 + 12x + 9$

$= 3(x^2+4x+3)$

$= 3(x+3)(x+1)$

3 × 1 = 3
3 + 1 = 4

b) $2d^2 - 22d + 56$

$= 2(d^2-11d+28)$

$= 2(d-7)(d-4)$

-7 × -4 = 28
-7 + -4 = -11

c) $5z^2 + 40z + 60$

$= 5(z^2+8z+12)$

$= 5(z+2)(z+6)$

2 × 6 = 12
2 + 6 = 8

d) $4s^2 - 8s - 32$

$= 4(s^2 - 2s - 8)$

$= 4(s-4)(s+2)$

___ × ___ =
___ + ___ =

5) Factor, if possible.

a) $x^4 + 10x^2y + 9y^2$

Let $k = x^2$

$= k^2 + 10ky + 9y^2$

$= (k + 9y)(k + y)$

$= (x^2 + 9y)(x^2 + y)$

9	×	1	= 9
9	+	1	= 10

b) $(x + a)^2 + 3(x + a) + 2$

Let $k = x + a$

$= k^2 + 3k + 2$

$= (k + 2)(k + 1)$

$= (x + a + 2)(x + a + 1)$

2	×	1	= 2
2	+	1	= 3

6) Determine binomials that represent the length and width of the rectangle. Then, determine the dimensions of the rectangle if x represents 15 cm.

$A = x^2 + 18x + 80$

$A = (x + 10)(x + 8)$

length width

10	×	8	= 80
10	+	8	= 18

Area is $x^2 + 18x + 80$

$A = (15 + 10)(15 + 8)$

$A = (25)(23)$

$A = 575\ cm^2$

The length is 25 cm
The width is 23 cm

Answers

1)a) $(x + 5)(x + 2)$ **b)** $(j + 9)(j + 3)$ **c)** $(k + 4)(k + 1)$ **d)** not possible **e)** not possible **f)** $(d + 6)(d + 4)$
2)a) $(m - 2)(m - 5)$ **b)** not possible **c)** $(y - 4)(y - 1)$ **d)** $(r - 8)^2$ **e)** not possible **f)** $(q - 9)(q - 1)$
3)a) $(a - 5)(a + 2)$ **b)** $(s + 5)(s - 2)$ **c)** $(d - 9)(d + 1)$ **d)** not possible **e)** $(g - 7)(g + 2)$ **f)** not possible
g) $(x + 7)(x - 6)$ **h)** not possible **i)** $(x + 7y)(x - 6y)$ **j)** $(x - 12y)(x + 4y)$ **k)** $(x^2 + 8)(x^2 + 3)$ **l)** $(x - 3)(x + 3)$
4)a) $3(x + 3)(x + 1)$ **b)** $2(d - 7)(d - 4)$ **c)** $5(z + 6)(z + 2)$ **d)** $4(s - 4)(s + 2)$
5)a) $(x^2 + 9y)(x^2 + y)$ **b)** $(x + a + 2)(x + a + 1)$
6) $A = (x + 10)(x + 8)$; the rectangle is 25 cm by 23 cm.