

12 - 5.1 Multiplying Polynomials - Going Deeper

Part 1: Multiplying Monomials and Binomials

Q1: $2x(x+3)$

$2x^2+6x$

or

	x	+ 3
2x	2x ²	+6x

$2x^2+6x$

Q2: $3x^2y^3(5x^2+1)$

$15x^4y^3+3x^2y^3$

or

	5x ²	+ 1
3x ² y ³	15x ⁴ y ³	3x ² y ³

$15x^4y^3+3x^2y^3$

Part 2: Multiplying Binomials and Binomials

Q3: $(x-3)(x+4)$

$x^2+4x-3x-12$

x^2+x-12

or

	x	+4
x	x ²	+4x
-3	-3x	-12

$x^2+4x-3x-12$

x^2+x-12

Q4: $(x+1)(2x+5)$

$2x^2+5x+2x+5$

$2x^2+7x+5$

or

	2x	+ 5
x	2x ²	+5x
+1	+2x	+5

$2x^2+7x+5$

Q5: $(x-2)(x-2)$

$x^2-2x-2x+4$

x^2-4x+4

or

	x	-2
x	x ²	-2x
-2	-2x	+4

x^2-4x+4

Q6: $(3x+1)(2x-1)$

$6x^2-3x+2x-1$

$6x^2-x-1$

or

	2x	-1
3x	6x ²	-3x
+1	+2x	-1

$6x^2-x-1$

Part 3: Harder Questions

Q7: $(x + 5)^2$

$$(x+5)(x+5)$$

$$x^2 + 5x + 5x + 25$$

$$\boxed{x^2 + 10x + 25}$$

	x	+ 5
x	x ²	+5x
+5	+5x	+25

$$\boxed{x^2 + 10x + 25}$$

Q8: $(x + 1)(x + 5)(x - 4)$

$$(x+1)(x^2 - 4x + 5x - 20)$$

$$(x+1)(x^2 + x - 20)$$

$$\underline{x^3} + \underline{x^2} - \underline{20x} + \underline{x^2} + \underline{x} - \underline{20}$$

$$\boxed{x^3 + 2x^2 - 19x - 20}$$

Q9: $2(3x - 2) - (4x + 7)(2x - 5)$

$$2(3x-2) - (4x+7)(2x-5)$$

$$(6x-4) - (8x^2-20x+14x-35)$$

$$(6x-4) - (8x^2-6x-35)$$

$$\underline{6x} - \underline{4} - \underline{8x^2} + \underline{6x} + \underline{35}$$

$$\boxed{-8x^2 + 12x + 31}$$

Q10: $3(x + 1)^2 - (x - 4)(2x + 5)$

$$3(x+1)(x+1) - (x-4)(2x+5)$$

$$3(x^2+x+x+1) - (2x^2+5x-8x-20)$$

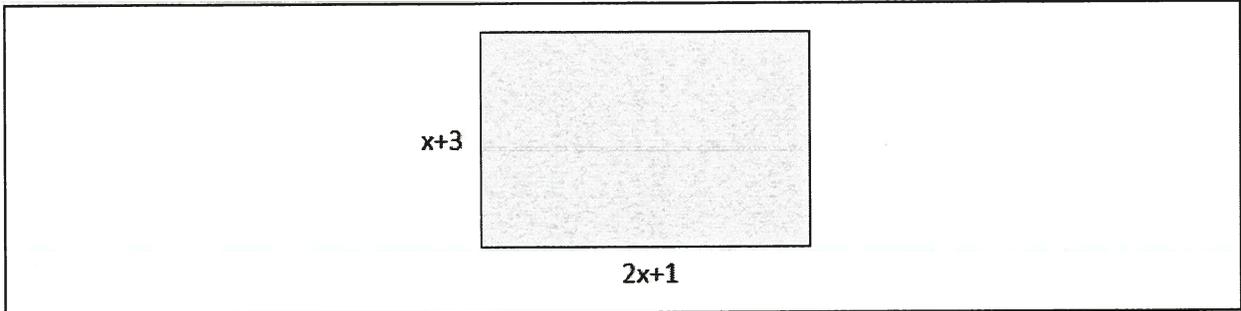
$$3(x^2+2x+1) - (2x^2-3x-20)$$

$$\underline{3x^2} + \underline{6x} + \underline{3} - \underline{2x^2} + \underline{3x} + \underline{20}$$

$$\boxed{x^2 + 9x + 23}$$

Part 4: Perimeters and Areas

Use the following information to answer Q11-Q13:



Q11: (Long Answer) Write an expression for the perimeter of the object.

$$\begin{aligned}
 P &= (L) + (w) + (L) + (w) \\
 &= \underline{(2x+1)} + \underline{(x+3)} + \underline{(2x+1)} + \underline{(x+3)} \\
 P &= 6x + 8
 \end{aligned}$$

Q12: The area of the object can be written as $ax^2 + bx + c$, where a , b , and c are __, __, and __.

(Record your three digit answer in the Numerical Response boxes below)

2	7	3	
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$$\begin{aligned}
 A &= (L)(w) \\
 &= (2x+1)(x+3)
 \end{aligned}$$

	x	$+3$
$2x$	$2x^2$	$+6x$
$+1$	$+1x$	$+3$

$$\begin{aligned}
 2x^2 + 7x + 3 &\Rightarrow a=2 \\
 ax^2 + bx + c &\Rightarrow b=7 \\
 &\Rightarrow c=3
 \end{aligned}$$

Q13: If the object has a perimeter of 32 meters, what is the area of the object, in m^2 ?

(Record your two digit answer in the Numerical Response boxes below)

6	3		
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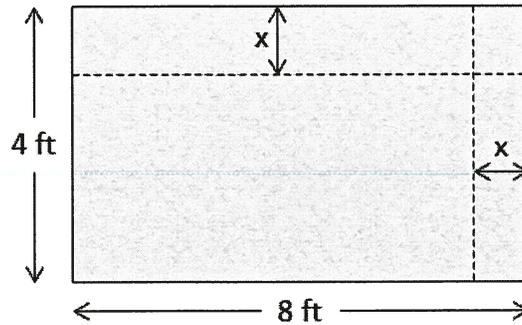
$$\begin{aligned}
 P &= 6x + 8 \\
 32 &= 6x + 8 \\
 -8 &\quad -8 \\
 24 &= 6x \\
 \div 6 &\quad \div 6 \\
 4 &= x
 \end{aligned}$$

← BEDMAS

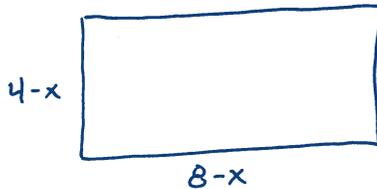
$$\begin{aligned}
 A &= 2x^2 + 7x + 3 \\
 &= 2(4)^2 + 7(4) + 3 \\
 &= 2(16) + 7(4) + 3 \\
 &= 32 + 28 + 3 \\
 &= 63 \text{ m}^2
 \end{aligned}$$

Use the following information to answer Q14-Q17:

You are building a skateboard ramp. You have a piece of plywood with dimensions of 4 ft by 8 ft. You cut x ft from length and width.



Q14: (Long Answer) Draw a diagram of the remaining piece of plywood, and label its dimensions.



Q15: (Long Answer) Write an expression for the perimeter of the remaining plywood.

$$\begin{aligned}
 P &= (L) + (w) + (L) + (w) \\
 &= (8-x) + (4-x) + (8-x) + (4-x) \\
 P &= 24 - 4x
 \end{aligned}$$

Q16: (Long Answer) Write an expression for the area of the remaining plywood.

$$\begin{aligned}
 A &= (L)(w) \\
 &= (8-x)(4-x)
 \end{aligned}$$

	4	-1x
8	32	-8x
-1x	-4x	+x ²

$$A = x^2 - 12x + 32$$

Q17: If $x = 1.5$, what is the area of the remaining plywood, in ft²?

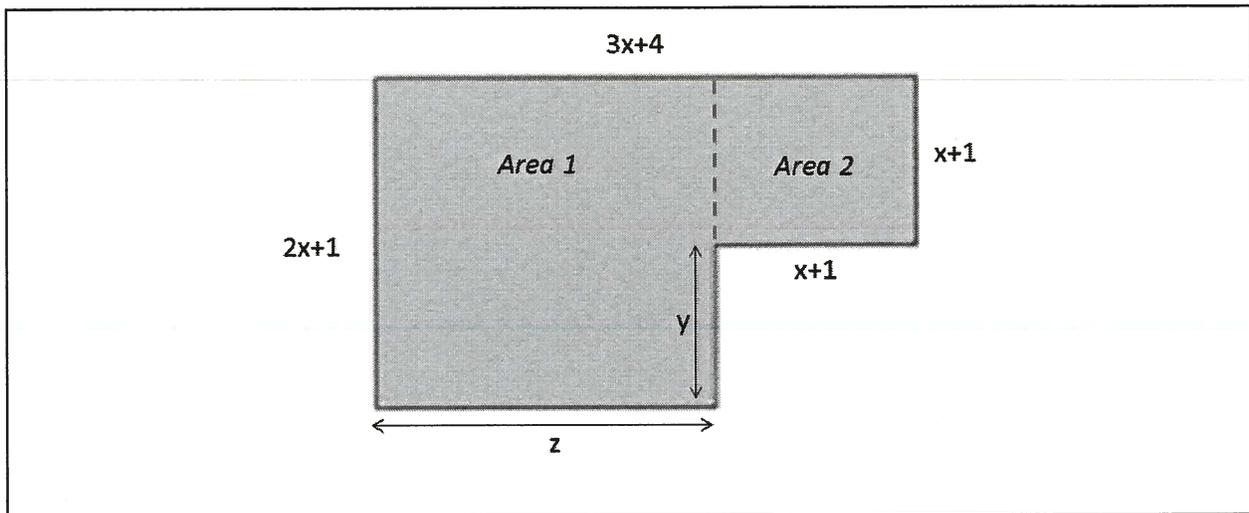
(Record your three digit answer in the Numerical Response boxes below)

1	6	.	3
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$$\begin{aligned}
 A &= (1.5)^2 - 12(1.5) + 32 \\
 &= 2.25 - 18 + 32 \\
 &= 16.25 \text{ ft}^2 \\
 &\approx 16.3 \text{ ft}^2
 \end{aligned}$$

KEY

Use the following information to answer Q18-Q21:



Q18: (Long Answer) Write an expression to describe the length of y in terms of x .

$$y = (2x+1) - (x+1)$$

$$= \underline{2x+1} - \underline{x} - \underline{1}$$

$$y = x$$

Q19: (Long Answer) Write an expression to describe the length of z in terms of x .

$$z = (3x+4) - (x+1)$$

$$= \underline{3x+4} - \underline{x} - \underline{1}$$

$$z = 2x + 3$$

Q20: (Long Answer) Write an expression to determine the area of **Area 1** in terms of x .

$$A_1 = (L)(w)$$

$$= (2x+3)(2x+1)$$

	$2x$	$+1$
$2x$	$4x^2$	$+2x$
$+3$	$+6x$	$+3$

$$4x^2 + 8x + 3$$

Q21: (Long Answer) Write an expression to determine the area of **Area 2** in terms of x .

$$A_2 = (L)(w)$$

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

$$A_2 = x^2 + 2x + 1$$

	x	$+1$
x	x^2	$+x$
$+1$	$+x$	$+1$

$$x^2 + 2x + 1$$

Part 5: Still remember Exponents and Radicals?

Use the following information to answer Q22-Q23:

The mixed radical $5x^2\sqrt[3]{5x}$ can be written in different forms.

Q22: The mixed radical can be written as an entire radical in the form $\sqrt[3]{abcx^d}$, where a , b , c , and d are __, __, __, and __.

(Record your four digit answer in the Numerical Response boxes below)

6 2 5 7

$$\begin{aligned} & \sqrt[3]{(5x^2)^3} \cdot \sqrt[3]{5x} \\ & \sqrt[3]{125x^6} \cdot \sqrt[3]{5x} \\ & \sqrt[3]{625x^7} \Rightarrow \begin{matrix} a=6 \\ b=2 \\ c=5 \\ d=7 \end{matrix} \\ & \sqrt[3]{abcx^d} \end{aligned}$$

Q23: The mixed radical can be written as a power in the form $5^{\frac{a}{b}}x^{\frac{c}{d}}$, where a , b , c , and d are __, __, __, and __.

(Record your four digit answer in the Numerical Response boxes below)

4 3 7 3

$$\begin{aligned} & 5x^2\sqrt[3]{5x} \\ & 5x^2(5x)^{1/3} \\ & 5^1 \cdot x^2 \cdot 5^{1/3} \cdot x^{1/3} \\ & 5^{(1+1/3)} \cdot x^{(2+1/3)} \\ & 5^{4/3} \cdot x^{7/3} \Rightarrow \begin{matrix} a=4 \\ b=3 \\ c=7 \\ d=3 \end{matrix} \\ & 5^{a/b} \cdot x^{c/d} \end{aligned}$$

Part 6: Textbook Practice