Chapter P
Section P.4

is this the word we want to use?

Warm-up Problem A. Does $(3+5)^2$ simplify to $8 \cdot 8$ or $9 + 25$?

Problem 1. Distribute each product. Then combine like terms.

(a) $2m(3m^3 + 7m^2 + 3)$

$$6m^4 + 7m^3 + 6m$$

(b) $-7z^3(5z^3 - 4z^2 + 2)$

$$-35z^9 + 28z^5 - 14z^3$$

(c) $(4r-2)(6r+1)$

$$(4r-2)6r + (4r-2)$$
$$24r^2 - 12r + 4r - 2$$
$$24r^2 - 8r - 2$$

(d) $(3x - 2p)(2x - p)$

$$(3x-2p)2x - p(3x-2p)$$
$$= 6x^2 - 4xp - 3xp + 2p^2$$
$$6x^2 - 7xp + 2p^2$$

(e) $(2k+5)(2k-5)$

$$4k^2 - 25$$

(f) $(8x + 5p)^2$

$$16x^2 + 25p^2 + 80xp$$

(g) $(5x-3)^2$

$$25x^2 + 9 - 30x$$

(h) $a^2(3-4a)(1-2a)$

$$a^2(3-4a) - 2a^3(3-4a)$$
$$3a^2 - 4a^3 - 6a^3 + 8a^4$$
$$8a^4 - 10a^3 + 3a^2$$

(i) $t^4(8t^2 - 3)^2$

$$t^4\left(64t^4 + 9 - 48t^2\right)$$
$$64t^8 + 9t^4 - 48t^6$$

(j) $(3a - 2)(a^2 - a + 1)$
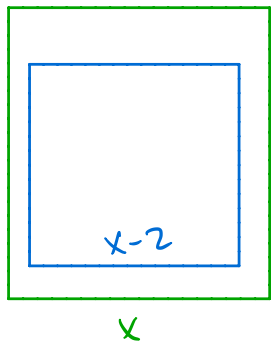
$$(3a-2)a^2 - (3a-2)a + (3a-2)$$
$$3a^3 - 2a^2 - 3a^2 + 2a + 3a - 2$$
$$3a^3 - 5a^2 + 5a - 2$$

(k) $(4x - \frac{2}{3})(4x + \frac{2}{3})$

$$16x^2 - \frac{4}{9}$$

1

Problem 2. A square mirror has sides measuring 2 feet less than the sides of a square painting. If the difference between their areas is 32 square feet, find the lengths of the sides of the mirror and the painting. Hint: Draw a picture.

— Mirror

— painting

$$x^2 - (x-2)^2 = 32$$

$$\Rightarrow x^2 - [x^2 + 4 - 4x] = 32$$

x−2

x

So length of painting's side is 18

length of mirror side is 16

$$\Rightarrow 4x - 4 = 32 \Rightarrow 4x = 36$$

$$\Rightarrow x = 18$$

Problem 3. Why is it true that $\frac{x^2-3x-9}{x-5} = x + 2 + \frac{1}{x-5}$?

↳ maybe re-word to give a reason why...

$$\frac{(x+2)(x-5)+1}{x-5} = \frac{x^2+2x-5x-10+1}{x-5} = \frac{x^2-3x-9}{x-5}$$

Problem 4. Use polynomial long division to find the following.

(a) $(x^2 - 8) \div (x - 2) = x+2 - \frac{4}{x-2}$

$$\require{enclose}
\begin{array}{r}
x+2 \\
x-2 \enclose{longdiv}{x^2-8} \\
-(x^2-2x) \\
\hline
2x-8 \\
-(2x-4) \\
\hline
-4
\end{array}$$

(b) $(x^2 - 8) \div (x - 3) = x+3 + \frac{1}{x-3}$

$$\begin{array}{r}
x+3 \\
x-3 \enclose{longdiv}{x^2-8} \\
-(x^2-3x) \\
\hline
3x-8 \\
-(3x-9) \\
\hline
1
\end{array}$$

(c) $(x^3 + 5) \div (x - 1) = x^2+x+1 + \frac{6}{x-1}$

$$\begin{array}{r}
x^2+x+1 \\
x-1 \enclose{longdiv}{x^3+5} \\
-(x^3-x^2) \\
\hline
x^2+5 \\
-(x^2-x) \\
\hline
x+5 \\
-(x-1) \\
\hline
6
\end{array}$$

(d) $(x^3 + 5) \div (x^2 - x + 1) = x+1 + \frac{4}{x^2-x+1}$

$$\begin{array}{r}
x+1 \\
x^2-x+1 \enclose{longdiv}{x^3+5} \\
-(x^3-x^2+x) \\
\hline
x^2-x+5 \\
-(x^2-x+1) \\
\hline
4
\end{array}$$

Additional Problems

EP 1. Distribute the following products. Then combine like terms.

(a) $(4m + 3)(m + 7)$

$4m^2 + 28m + 3m + 21$

$4m^2 + 31m + 21$

(b) $(2m + 3n)(-3m + 4n)$

$-6m^2 + 8mn - 9mn + 12n^2$

$= 6m^2 - mn$

(c) $(8s + 1)(3s^2 + s - 5)$

$24s^3 + 8s^2 - 40s + 3s^2 + s - 5$

$24s^3 + 11s^2 - 39s - 5$

EP 2. The cost in dollars to produce b baseball caps is $C(b) = 4.3b + 7.5$. The revenue in dollars from sales of b caps is $R(b) = 25b$.

(a) Write and simplify a function $P(b)$ that gives profit in terms of b.

we don't
cover this word
at least it
is not in
the lesson plan...

(b) Find the profit if 12 caps are produced and sold.