

1. Simplify. Answers should not have negative or zero exponents.

a.  $\frac{9}{x^{-3}}$

$9x^3$

b.  $4^{-2}$

$\frac{1}{16}$

c.  $\frac{a^{-2}}{5b^{-3}}$

$\frac{b^3}{5a^2}$

2. Turn into scientific notation.

a. 377,900,000

$3.779 \times 10^8$

b. 9,650

$9.65 \times 10^3$

c. 0.000000126

$1.26 \times 10^{-7}$

3. Simplify.

a.  $\frac{4x^3}{12x^7}$

$\frac{1}{3x^4}$

b.  $\left(\frac{3m^{-4}}{n^5}\right)^2$

$= \left(\frac{3}{m^4 n^5}\right)^2 = \frac{9}{m^8 n^{10}}$

c.  $64^{\frac{1}{2}} - 27^{\frac{1}{3}}$

$\sqrt{64} - \sqrt[3]{27}$

$8 - 3 = 5$

d.  $16^{\frac{3}{2}} - 27^{\frac{2}{3}}$

$(16^{\frac{1}{2}})^3 - (27^{\frac{1}{3}})^2$

$4^3 - 3^2$

$64 - 9 = 55$

e.  $\sqrt{49x^{10}y^6}$

$7x^5y^3$

f.  $\sqrt[3]{m^9n^{15}}$

$m^3n^5$

4. Add or subtract.

a.  $-6x^3 + 5x + 2x^3 + 8x^3$

$4x^3 + 5x$

b.  $7xy - 4x^2y - 2xy$

$-4x^2y + 5xy$

c.  $(5x^2 + 2x - 3) - (9x^2 - 4x - 1)$

$5x^2 + 2x - 3 - 9x^2 + 4x + 1$

$-4x^2 + 6x - 2$

d.  $(7x^2 - 2x + 5) + (-3x^2 - 8x - 1)$

$4x^2 - 10x + 5$

5. Multiply and simplify completely.

a.  $(-2x^2y)(3x^4y)(2y)$   
 $-12x^6y^3$

b.  $3a(4a-2b+c)$   
 $12a^2-6ab+3ac$

c.  $-4x(3x^2-6x-1)$   
 $-12x^3+24x^2+4x$

d.  $(3x-2)(5x+1)$   
 $15x^2+3x-10x-2$   
 $15x^2-7x-2$

e.  $(x+5)^2$   
 $(x+5)(x+5)$   
 $x^2+5x+5x+25$   
 $x^2+10x+25$

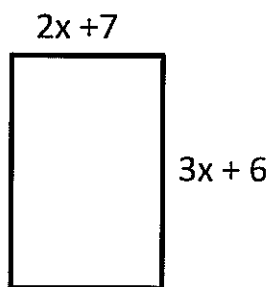
f.  $(x+4y)(x-4y)$   
 $x^2-4yx+4yx-16y^2$   
 $x^2-16y^2$

g.  $(5x^2-3)(5x^2+3)$   
 $25x^4+15x^2-15x^2-9$   
 $25x^4-9$

h.  $(3x-4)^2$   
 $(3x-4)(3x-4)$   
 $9x^2-12x-12x+16$   
 $9x^2-24x+16$

i.  $(2x+3)(x^2-6x-5)$   
 $2x^3-12x^2-10x$   
 $+3x^2-18x-15$   
 $2x^3-9x^2-28x-15$

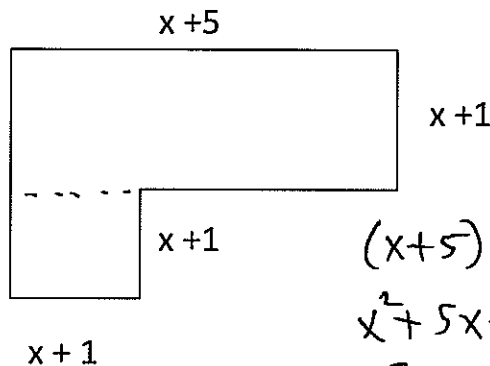
7. Find the area and/or perimeter of each shape below. Make sure to simplify your answers!



$2(2x+7) + 2(3x+6)$   
 $4x+14+6x+12$

perimeter:

$10x+26$

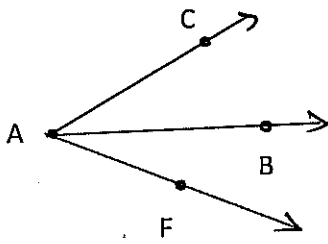


$(x+5)(x+1) + (x+1)(x+1)$   
 $x^2+5x+1x+1 + x^2+1x+1x+1$   
 $x^2+6x+1 + x^2+2x+1$   
 $2x^2+8x+2$

area:

$2x^2+8x+2$

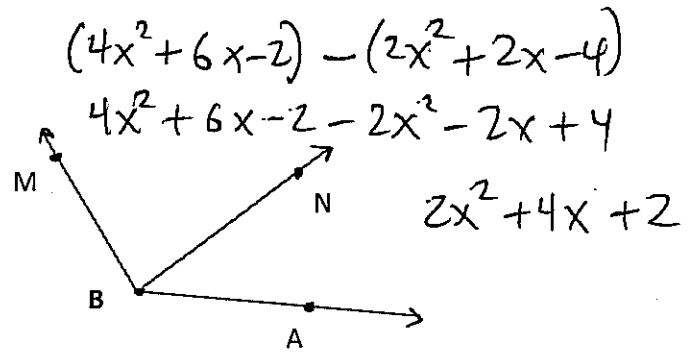
8. Find the angle indicated.



$$m\angle CAB = 6x + 3$$

$$m\angle FAB = 4x - 9$$

$$m\angle CAF = ? \quad \boxed{10x - 6}$$

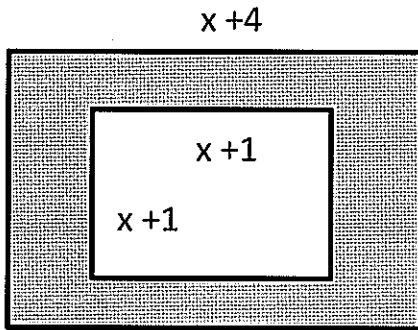


$$m\angle MBA = 4x^2 + 6x - 2$$

$$m\angle NBA = 2x^2 + 2x - 4$$

$$m\angle MBN = ? \quad \boxed{2x^2 + 4x + 2}$$

9. Write a polynomial that describes the area of the shaded region.



Big  
rectangle

$$\begin{aligned} A &= (x+4)(x+2) \\ &= x^2 + 2x + 4x + 8 \\ &= x^2 + 6x + 8 \end{aligned}$$

$x+2$

Small  
rectangle

$$\begin{aligned} A &= (x+1)(x+1) \\ &= x^2 + 1x + 1x + 1 \\ &= x^2 + 2x + 1 \end{aligned}$$

$$\begin{aligned} \text{Shaded} &= \text{Big rectangle} - \text{Small rectangle} \\ &= (x^2 + 6x + 8) - (x^2 + 2x + 1) \\ &= x^2 + 6x + 8 - x^2 - 2x - 1 \\ &= \boxed{4x + 7} \end{aligned}$$

10. Fill in the blanks.

a.  $2x^2y \cdot \frac{-3x^2y^4}{6x^4y^5}$

b.  $(3x-2) \cdot \frac{2x}{6x^2-4x}$

c.  $(x-5) \cdot \frac{(x+2)}{x^2-3x-10}$

d.  $(x-2) \cdot \frac{(x+5)}{x^2+3x-10}$

$$x^2 + 2x - 5x - 10$$

$$x^2 - 2x + 5x - 10$$

$$x^2 - 3x - 10$$

$$x^2 + 3x - 10$$