Name Key

8.4 Practice Problems

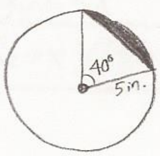
1) a. What is the formula for area of a SAS triangle?

$\frac{1}{2}ab\sin C$ (or $\frac{1}{2}bc\sin A$ or $\frac{1}{2}ac\sin B$)

b. What is the formula for area of a SSS triangle?

$\sqrt{s(s-a)(s-b)(s-c)}$ where $s = \frac{a+b+c}{2}$

2) Find the area of the segment of a circle whose radius is 5 inches, formed by a central angle of 40°.



$$\text{Area}_{\text{segment}} = \text{Area}_{\text{sector}} - \text{Area}_{\text{triangle}}$$

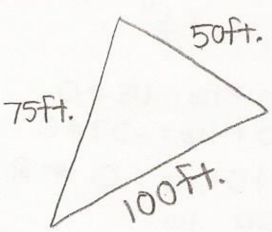
$$= \frac{1}{2}r^2\theta - \frac{1}{2}ab\sin C$$

$$= \frac{1}{2}(25)\left(\frac{2\pi}{9}\right) - \frac{1}{2}(25)\sin 40^\circ$$

$$= \frac{25\pi}{9} - \frac{25}{2}\sin 40^\circ \approx 8.73 - 8.03$$

$$\approx \boxed{0.70\ in^2}$$

3) The dimensions of a triangular lot are 100 feet by 50 feet by 75 feet. If the price of such land is \$3 per square foot, how much does the lot cost?



$$\text{Area} = \sqrt{\frac{225}{2}\left(\frac{125}{2}\right)\left(\frac{75}{2}\right)\left(\frac{25}{2}\right)} \qquad s = \frac{225}{2}$$

$$= 1{,}815.5\ ft^2$$

$$\text{COST} = \$3\,(1{,}815.5\,ft) = \boxed{\$5{,}446.50}$$

Name Key

4.5 Practice Problems

1) Find the real zeroes of each polynomial function and use them to factor f over the real numbers.

a. $f(x) = x^3 + 8x^2 + 11x - 20$

$p: \pm1, \pm2, \pm4, \pm5, \pm10, \pm20 \quad q: \pm1$

$\frac{p}{q}: \pm1, \pm2, \pm4, \pm5, \pm10, \pm20$

$f(1) = 1+8+11-20 = 0 \leftarrow$ 1 is a root!

1	1	8	11	-20
	↓	1	9	20
	1	9	20	$\boxed{0}$

$x^2 + 9x + 20 = (x+4)(x+5)$

so $\boxed{f(x) = (x-1)(x+4)(x+5)}$

b. $f(x) = 3x^3 + 6x^2 - 15x - 30$

$f(x) = 3(x^3 + 2x^2 - 5x - 10)$

Factor by Grouping! $f(x) = 3(x^2(x+2) - 5(x+2))$

$f(x) = 3(x+2)(x^2-5)$

$x^2 - 5 = 0$

$x^2 = 5$

$x = \pm\sqrt{5}$

so $\boxed{f(x) = 3(x+2)(x-\sqrt{5})(x+\sqrt{5})}$

2) Solve each equation in the real number system.

a. [redacted] $2x^3 - 3x^2 - 3x - 5 = 0$

$p: \pm1, \pm5 \quad q: \pm1, \pm2$

$\frac{p}{q}: \pm1, \pm5, \pm\frac{1}{2}, \pm\frac{5}{2}$

$\boxed{x = \{\tfrac{5}{2}\}}$

$f(1) = 2-3-3-5 = -9 \neq 0$

$f(-1) = -2-3+3-5 = -7 \neq 0$

$f(5) = 250-75-15-5 = -70 \neq 0$

$f(-5) = -250-75+15-5 = -315 \neq 0$

$f(\frac{1}{2}) = \frac{1}{4} - \frac{3}{4} - \frac{3}{2} - 5 = -7 \neq 0$

$f(-\frac{1}{2}) = -\frac{1}{4} - \frac{3}{4} + \frac{3}{2} - 5 = -\frac{9}{2} \neq 0$

$f(\frac{5}{2}) = \frac{125}{4} - \frac{75}{4} - \frac{15}{2} - 5 = 0 \leftarrow \frac{5}{2}$ is a solution!

$\frac{5}{2}$	2	-3	-3	-5
	↓	5	5	5
	2	2	2	$\boxed{0}$

$2x^2 + 2x + 2 = 2(x^2 + x + 1) = 0$

No Real solutions!

b. $2x^4 + x^3 - 24x^2 + 20x + 16 = 0$

$p: \pm1, \pm2, \pm4, \pm8, \pm16 \quad q: \pm1, \pm2$

$\frac{p}{q}: \pm1, \pm2, \pm4, \pm8, \pm16, \pm\frac{1}{2}$

$f(1) = 2+1-24+20+16 = 15 \neq 0$

$f(-1) = 2-1-24-20+16 = -27 \neq 0$

$f(2) = 32+8-96+40+16 = 0 \leftarrow 2$ is a solution!

2	2	1	-24	20	16
	↓	4	10	-28	-16
	2	5	-14	-8	$\boxed{0}$

$2x^3 + 5x^2 - 14x - 8$ $\quad p: \pm1, \pm2, \pm4, \pm8 \quad q: \pm1, \pm2$

$\frac{p}{q}: \pm1, \pm2, \pm4, \pm8, \pm\frac{1}{2}$

$f(2) = 16+20-28-8 = 0 \leftarrow 2$ is solution again!

2	2	5	-14	-8
	↓	4	18	8
	2	9	4	$\boxed{0}$

$2x^2 + 9x + 4 = (2x+1)(x+4)$

$x = -\frac{1}{2} \quad x = -4$

$\boxed{x = \{-4, -\tfrac{1}{2}, 2\}}$