Pg. 31 20, 24-32 even, 40, 42, 47-55 odd

20. $M\overset{(x_1, y_1)}{(4, 0)}$ $L\overset{(x_2, y_2)}{(-2, -3)}$

$$\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$$
$$=\sqrt{(-2-4)^2+(-3-0)^2}$$
$$=\sqrt{(-6)^2+(-3)^2}$$
$$=\sqrt{36+9} = \sqrt{45}$$ ← need to simplify!

$\sqrt{9}$ $\sqrt{5}$

3 $\sqrt{5}$ $= 3\sqrt{5} = 6.7$ units

need both answers

26. $P\overset{(x_1, y_1)}{(3, 4)}$ $Q\overset{(x_2, y_2)}{(7, 2)}$

$$\sqrt{(7-3)^2+(2-4)^2}$$
$$=\sqrt{4^2+(-2)^2}$$
$$=\sqrt{16+4} = \sqrt{20} = 2\sqrt{5} = 4.5 \text{ units}$$

need both

$\sqrt{4}$ $\sqrt{5}$

2 $\sqrt{5}$

28. $Y\overset{x_1\ y_1}{(-4, 9)}$ $Z\overset{x_2\ y_2}{(-5, 3)}$

$$\sqrt{(-5-(-4))^2+(3-9)^2}$$
$$=\sqrt{(-1)^2+(-6)^2}$$
$$\sqrt{1+36} = \sqrt{37} = 6.1 \text{ units}$$

↑ cannot be simplified

30. $\overset{x_1\,y_1}{C(5,1)}$ $\overset{x_2\,y_2}{D(3,6)}$

$\sqrt{(3-5)^2+(6-1)^2}$

$=\sqrt{(-2)^2+(5)^2}$ ← cannot be simplified

$=\sqrt{4+25}=\sqrt{29}=5.4$ units

32. a) Penny $(\overset{x_1\,y_1}{4,6})$ Akiko $(\overset{x_2\,y_2}{7,1})$

$\sqrt{(7-4)^2+(1-6)^2}=\sqrt{3^2+(-5)^2}=\sqrt{9+25}=\sqrt{34}=5.8$ blocks

b) Penny moves north 3 blocks so her coordinates change to $(\overset{x_1\,y_1}{4,9})$ → added 3 units to the y-value
Akiko moves west 5 blocks so his coordinates change to $(\overset{x_2\,y_2}{2,1})$ → subtracted 5 units from his x-value

$\sqrt{(2-4)^2+(1-9)^2}=\sqrt{(-2)^2+(-8)^2}=\sqrt{4+64}=\sqrt{68}=8.2$ blocks

Midpoints

40. $\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)=\left(\frac{12+7}{2},\frac{2+9}{2}\right)=\left(\frac{19}{2},\frac{11}{2}\right)=(9.5,5.5)$

42. $\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)=\left(\frac{-2+3}{2},\frac{5+(-17)}{2}\right)=\left(\frac{1}{2},\frac{-12}{2}\right)=\left(\frac{1}{2},-6\right)$

47. A (x_1,y_1) — B $(-2,5)$ — C $(-5,4)$ (x_2,y_2)

$\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

$\cancel{2\cdot}\frac{x_1+(-5)}{\cancel{2}}=-2\cdot 2$ ← x-value in midpt

$x_1-5=-4$
$+5 \quad +5$
$\boxed{x_1=1}$

$\frac{y_1+y_2}{2}=\frac{y_1+4}{\cancel{2}\times\cancel{2}}=5$ ← y-value in midpt
$\times 2$

$y_1+4=10$
$\boxed{y_1=6}$

(1,6)

49. A B C

$(-4,2)$ $(6,-1)$ $(x_2 y_2)$

(x_1, y_1)

$$\left(\frac{x_1+y_2}{2}, \frac{y_1+y_2}{2}\right)$$

$$\cancel{2}\cdot\frac{-4+y_2}{\cancel{2}} = 6\cdot 2 \qquad \cancel{2}\cdot\frac{2+y_2}{\cancel{2}} = -1\cdot 2$$

$$-4+x_2=12 \qquad 2+y_2=-2$$

$$x_2=16 \qquad y_2=-4$$

$$\boxed{(16,-4)}$$

51. A B C

$(4,-.25)$ $(-4,6.5)$ $(x_2 y_2)$

$(x_1 y_1)$

$$\frac{x_1+y_2}{2} \quad \cancel{2}\cdot\frac{4+x_2}{\cancel{2}} = -4\cdot 2 \qquad \frac{y_1+y_2}{2} = \frac{-.25+y_2}{\cancel{2\times 2}} = 6.5\times 2$$

$$4+x_2=-8 \qquad -.25+y_2=13$$

$$x_2=-12 \qquad y_2=13.25$$

$$\boxed{(-12,13.25)}$$

53. F M G ($3x-4$, $5x-26$)

$3\cancel{x}-4=5x-2\cancel{6}$ → because they are congruent segments due to M being midpoint

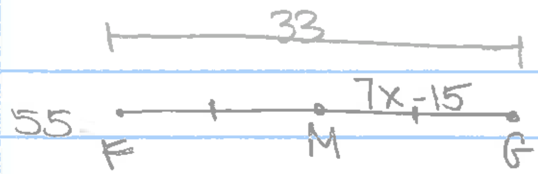
$-3x+26 \quad -3x+26$

$$\frac{22}{2}=\frac{2x}{2} \qquad x=11$$

$$3x-4+5x-26=FG$$

$$3(11)-4+5(11)-26=FG$$

$$\boxed{58 = FG}$$



MG is half of FG because M is midpoint.

Therefore, $MG = 33 \div 2 = 16.5$

$$7x - 15 = 16.5$$

$$+15 \quad +15$$

$$7x = 31.5$$

$$\boxed{x = 4.5}$$