MAC 1105
practice for the test
chapter 2 — Solutions

1. $(7,5)$, $(-7,-4)$

$D=\sqrt{(7--7)^2+(5--4)^2}=\sqrt{14^2+9^2}=$

$=\boxed{\sqrt{277}\cong 16.64}$

B

2. $(-1,-2)$, $(6,-3)$

$D=\sqrt{(-1-6)^2+(-2--3)^2}=\sqrt{(-7)^2+1^2}$

$=\sqrt{49+1}$

$\boxed{\sqrt{50}=5\sqrt{2}\cong 7.07}$

B

3. $(-11,0)$, $(1,5)$

$D=\sqrt{(-11-1)^2+(0-5)^2}=\sqrt{(-12)^2+(-5)^2}$

$=\sqrt{144+25}=\sqrt{169}=\boxed{13}$

D

4. $(k,0)$, $(-5,5)$

$D=\sqrt{29}$

$D=\sqrt{(k--5)^2+(0-5)^2}=\sqrt{29}$

$\sqrt{(k+5)^2+25}=\sqrt{29}$ square both sides

$(k+5)^2+25=29$

$(k+5)^2=29-25=4$

$k+5=\pm\sqrt{4}$

$k+5=2$

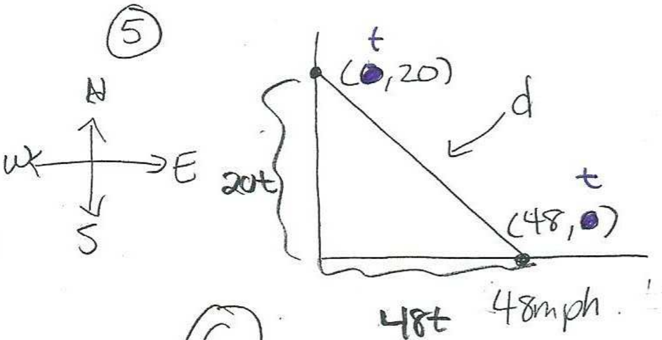
$k=-3$

$k+5=-2$

$k=-7$

A

5.



C

treat it as pythagorean theorem

$(20t)^2+(48t)^2=d^2$

$400t^2+2304t^2=d^2$

$2704t^2=d^2$

$52t=d$

C

6 midpoint $\left(\frac{6+8}{2}, \frac{3+9}{2}\right) = \left(\frac{14}{2}, \frac{12}{2}\right) = \boxed{(7,6)}$

(6,3)
(8,9)

C

7 (−1,−7)
(3,−4)

$\left(\frac{-1+3}{2}, \frac{-7-4}{2}\right) = \left(\frac{2}{2}, \frac{-11}{2}\right) = \boxed{\left(1, -\frac{11}{2}\right)}$

C

8 (7,1)
(−16,−16)

$\left(\frac{7-16}{2}, \frac{1-16}{2}\right) = \boxed{\left(\frac{-9}{2}, \frac{-15}{2}\right)}$

D

9 (+2,−1) endpoint
(1,−6) midpoint
find the other endpoint
(x,y)

$\left(\frac{x+2}{2}, \frac{-1+y}{2}\right) = (1,-6)$

$\frac{x+2}{2} = 1$ $\qquad$ $\frac{-1+y}{2} = -6$

$x+2 = 2$ $\qquad$ $-1+y = -12$

$x = 0$ $\qquad$ $y = -11$

$\boxed{(0,-11)}$

A

10 (3,15)

(−,+) II	(+,+) I
(−,−) III	(+,−) IV

I $\qquad$ A

11 center = $\boxed{(6,5)}$

$\frac{4+8}{2} = \frac{12}{2} = 6$

radius = 2

(4,5) to (6,5)

d = 2

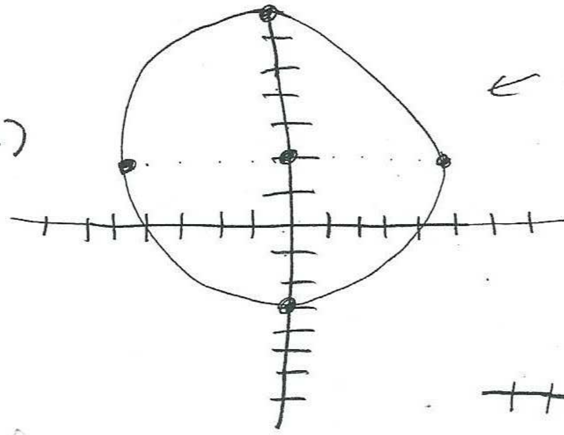
$(x-h)^2 + (y-k)^2 = r^2$

$(x-6)^2 + (y-5)^2 = 2^2$

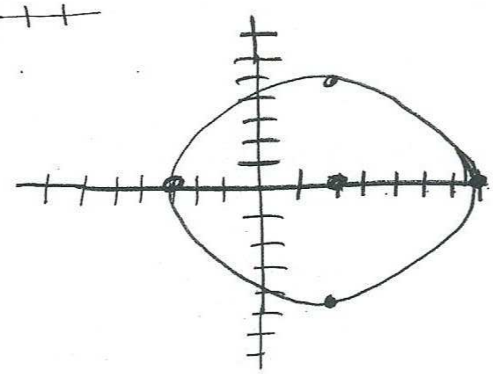
$\boxed{(x-6)^2 + (y-5)^2 = 4}$

(12) $r=5$

$(h,k)=(0,2)$



← circle.



(13) $r=5$ $(h,k)=(2,0)$

(14) $x^2+y^2-8x-2y+13=0$

$$x^2-8x+\underline{16}+y^2-2y+\underline{1}=-13+\underline{16}+\underline{1}$$

$\left(\frac{-8}{2}\right)^2$ $\left(\frac{-2}{2}\right)^2$

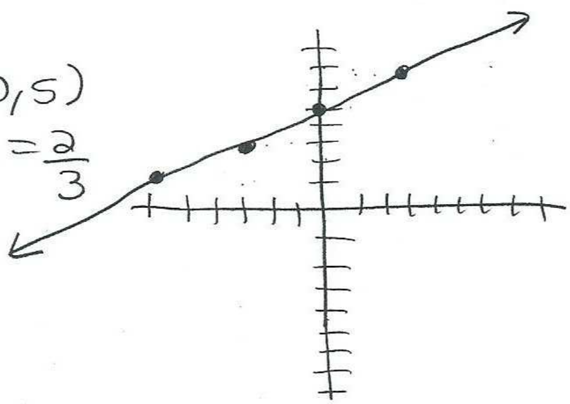
$$(x-4)^2+(y-1)^2=-13+17=4$$

$\boxed{\text{center } (4,1) \text{ radius}=2}$

(15) $(10,1)$ $(0,0)$ $m=\frac{1-0}{10-0}=\frac{1}{10}$ (c)

(16) $(0,5)$

$m=\frac{2}{3}$



$m=\frac{2}{3}=\frac{-2}{-3}\left(\frac{y}{x}\right)$

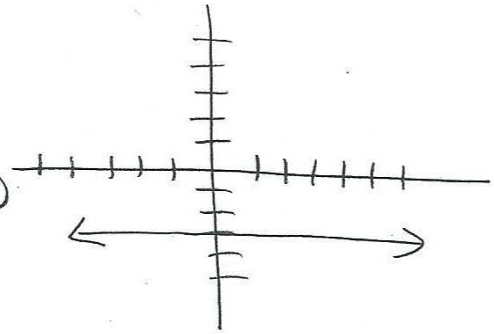
(17) $P=(3,-3)$

$m=0$

0 slope ⇒ horizontal line

($y=$ constant)

$y=-3$



18 $(-3,-6)$
$(+1,-1)$

$$m = \frac{-6--1}{-3-1} = \frac{-6+1}{-4} = \frac{-5}{-4} = \frac{5}{4}$$

use $(1,-1)$
$m = \frac{5}{4}$

$$\frac{5}{4} = \frac{y--1}{x-1}$$

$$\left(m = \frac{y-y_1}{x-x_1}\right)$$

form of
slope-intercept

$$4(y+1) = 5(x-1)$$
$$4y+4 = 5x-5$$
$$4y = 5x-5-4$$
$$4y = 5x-9$$
$$\boxed{y = \frac{5}{4}x - \frac{9}{4}}$$

C

19 $m=4$
$(-4,-10)$

$$\frac{4}{1} = \frac{y+10}{x+4}$$

$$1(y+10) = 4(x+4)$$
$$y+10 = 4x+16$$
$$y = 4x+16-10$$
$$\boxed{y = 4x+6}$$

A

20 linear (C, F)
$(10, 50)$
$(30, 86)$

$$m = \frac{86-50}{30-10} = \frac{36}{20} = \frac{9}{5}$$

$$\frac{9}{5} = \frac{F-50}{C-10}$$

solve for C

$$9(C-10) = 5(F-50)$$
$$9C-90 = 5F-250$$
$$9C = 5F-250+90$$
$$9C = 5F-160$$
$$\boxed{C = \frac{5}{9}F - \frac{160}{9}}$$

D

when F=2

$$C = \frac{5}{9}(29) - \frac{160}{9}$$
$$= \frac{145}{9} - \frac{160}{9}$$
$$= \frac{-15}{9}$$
$$= \boxed{\frac{-5}{3}}$$

21 $\perp$ to $y = \frac{1}{4}x+2$
$(3,-2)$

need $m=-4$
$(3,-2)$

$$y-y_1 = m(x-x_1)$$
$$y+2 = -4(x-3)$$
$$y+2 = -4x+12$$
$$\boxed{y = -4x+10}$$

D

22. $\perp$ to $y=-7$ through $(4,9)$

($\perp$ to $y=$ is an $x=$) so $\boxed{x=4}$

C

23. $\boxed{A=kt^2}$

$180=k(6)^2$

$A=180$
$t=6$

$180=36k$

$\boxed{5=k}$

$\boxed{A=5t^2}$

C

24. $\boxed{w=kI^2R}$

$w=12$ watts
$I=0.2$ amps
$R=300$ ohms

$12=k(0.2)^2(300)$

$12=k(12)$

$\boxed{1=k}$

$\boxed{w=(1)I^2R}$

$w=I^2R$

$w=(0.3)^2(250)$

$\boxed{w=22.5\text{ watts}}$

B

25. $z=k\sqrt[3]{x}\,y^3$

$z=2$
$x=125$
$y=2$

$2=k\sqrt[3]{125}\,(2)^3$

$2=k(5)(8)$

$\boxed{\frac{1}{20}=k}$

$\boxed{z=\frac{1}{20}\sqrt[3]{x}\,y^3}$

A

26. $P=\frac{k}{n}$

p = price
n = number of people

$P=26$
$n=51$

$26=\frac{k}{51}$

$1326=k$

$\boxed{P=\frac{1326}{n}}$

A

when 96 people (n)

$P=\frac{1326}{96}$

$\boxed{P=\$13.81}$

27. $3x-8y=-1$

$-8y=-3x-1$

$y=\frac{3}{8}x+\frac{1}{8}$

$32x+12y=-15$

$12y=-32x-15$

$y=\frac{-32}{12}x-\frac{15}{12}$

$y=-\frac{8}{3}x-\frac{5}{4}$

slopes are opposite reciprocals, so $\perp$

B

28 (4,3) $\perp$ to $y=2x$

so (4,3) $m=-\frac{1}{2}$

$-\frac{1}{2}=\frac{y-3}{x-4}$

$2(y-3)=-1(x-4)$

$2y-6=-x+4$

$2y=-x+4+6$

$2y=-x+10$

$\boxed{y=-\frac{1}{2}x+5}$

D

29 // to $-5x-y=6$

(0,0) $m=-5$

$-y=5x+6$

$y=-5x-6$

$y-y_1=m(x-x_1)$

$y-0=-5(x-0)$

$\boxed{y=-5x}$

B

30 $y=5x$ $\perp \Rightarrow -\frac{1}{5}$ D

31 // to $y=5$ containing (8,9)

// to $y=$ is another $y=$

so $y=9$

B

32 A

33 (3,4) // to $y=2x$

$m=2$ (3,4)

$y-4=2(x-3)$

$y-4=2x-6$

$y=2x-2$

C

34 C

35 Profit = Revenue − Cost

$P(x)=1.92x-(1.32x+37{,}000)$

$\boxed{P(x)=0.6x-37{,}000}$

$P(75{,}000)=0.6(75{,}000)-37{,}000=\boxed{\$8000}$

36 (5,0) (0,-4)

$m = \frac{0--4}{5-0} = \frac{4}{5}$

$\frac{4}{5} = \frac{y-0}{x-5}$

$5(y-0) = 4(x-5)$

$5y = 4x - 20$

$\boxed{y = \frac{4}{5}x - 4}$

slope-intercept form

also

$5y = 4x - 20$

$20 = 4x - 5y$

$\boxed{4x - 5y = 20}$

A

37 (-4,-9) (0,8)

$m = \frac{-9-8}{-4-0} = \frac{-17}{-4} = \frac{17}{4}$

$m = \frac{y-y_1}{x-x_1}$

$\frac{17}{4} = \frac{y-8}{x-0}$

$17(x-0) = 4(y-8)$

$17x = 4y - 32$

$\boxed{17x - 4y = -32}$

D

$4(y-8) = 17(x-0)$

$4y - 32 = 17x$

$4y = 17x + 32$

$\boxed{y = \frac{17}{4}x + 8}$

38 (-7,6) (-4,1)

$m = \frac{6-1}{-7+4} = \frac{5}{-3}$

$\frac{-5}{3} = \frac{y-6}{x+7}$

$-5(x+7) = 3(y-6)$

$-5x - 35 = 3y - 18$

$-5x - 3y = -18 + 35$

$\boxed{-5x - 3y = 17}$

$\boxed{5x + 3y = -17}$

D

39 $9x - 10y = 90$

$-10y = -9x + 90$

$y = \frac{9}{10}x - 9$

$\boxed{m = \frac{9}{10} \quad (0,-9)}$

B

40 $x + y = 9$

$y = -x + 9$

$\boxed{m = -1 \quad (0,9)}$

C

41 $5x - 6y = 2$

$-6y = -5x + 2$

$\boxed{y = \frac{5}{6}x - \frac{1}{3}}$

$\boxed{m = \frac{5}{6} \quad (0, -\frac{1}{3})}$

B

42 $(4,-3)$
$(3,-5)$

$m = \frac{-3+5}{4-3} = \frac{2}{1} = 2$

$y + 3 = 2(x-4)$

$y + 3 = 2x - 8$

$y = 2x - 11$

B

43 vertical
$(x = \text{constant})$

$(8.4, -5.5)$

$\boxed{x = 8.4}$

D

44 vertical
through $(7,2)$

$\boxed{x = 7}$

C

45 $(7,8)$
$(1,-3)$

$m = \frac{8 - -3}{7-1} = \frac{11}{6}$

B

46 $(\underline{\underline{-7}}, -7)$ \$ $(\underline{\underline{-7}}, 6)$ so $x = -7$

$m = \text{undefined}$
(vertical)

D

(47) $x^2+y^2-14x-12y+85=64$

$x^2-14x+\underline{49}+y^2-12y+\underline{36}=64-85+\underline{49}+\underline{36}$

$\left(\frac{-14}{2}\right)^2$ $\left(\frac{-12}{2}\right)^2$

$(x-7)^2+(y-6)^2=64$

center $=(7,6)$
$r=\sqrt{64}=8$

D

(48) $x^2+y^2+8x+12y=-3$

$x^2+8x+\underline{16}+y^2+12y+\underline{36}=-3+\underline{16}+\underline{36}$

$\left(\frac{8}{2}\right)^2$ $\left(\frac{12}{2}\right)^2$

D

$(x+4)^2+(y+6)^2=49$

$(-4,-6)$
$r=\sqrt{49}=7$

(49) $r=11$ $(h,k)=(0,-10)$

$(x-h)^2+(y-k)^2=r^2$

$(x-0)^2+(y+10)^2=11^2$

$\boxed{x^2+(y+10)^2=121}$

C

(50) $r=7$ $(h,k)=(-1,-4)$

$(x+1)^2+(y+4)^2=(7)^2$

$\boxed{(x+1)^2+(y+4)^2=49}$

A

(51) $(x-7)^2+(y+9)^2=100$

$C=(7,-9)$
$r=\sqrt{100}=10$

B