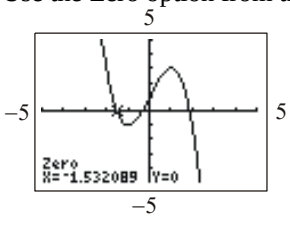
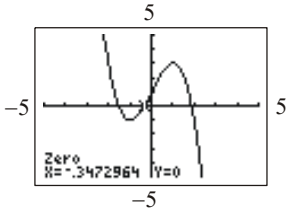
Chapter 1
Graphs

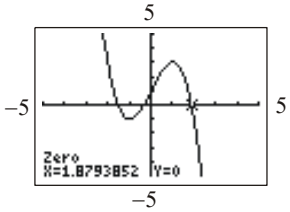
Chapter 1 Mixed Review Worksheets

1. $-x^3+3x+1=0$

Use the Zero option from the CALC menu.



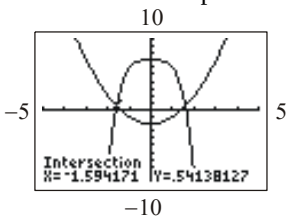


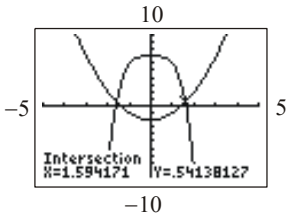


The solution set is $\{-1.53,-0.35,1.88\}$.

2. $-x^4+7=x^2-2$

Use the Intersect option on the CALC menu.





The solution set is $\{-1.59,1.59\}$.

3. $(0,0),(-4,6)$

a. $\text{distance}=\sqrt{(-4-0)^2+(6-0)^2}$

$=\sqrt{16+36}=\sqrt{52}$

$=2\sqrt{13}$

b. $\text{midpoint}=\left(\dfrac{0+(-4)}{2},\dfrac{0+6}{2}\right)$

$=\left(\dfrac{-4}{2},\dfrac{6}{2}\right)=(-2,3)$

4. $(-2,2),(1,4)$

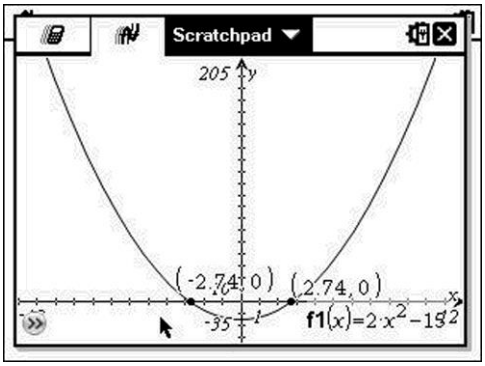
a. $\text{distance}=\sqrt{(1-(-2))^2+(4-2)^2}$

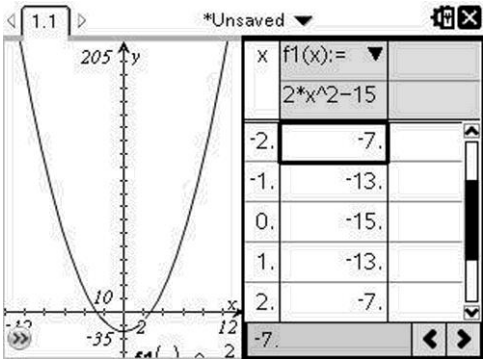
$=\sqrt{9+4}=\sqrt{13}$

b. $\text{midpoint}=\left(\dfrac{-2+1}{2},\dfrac{2+4}{2}\right)$

$=\left(-\dfrac{1}{2},\dfrac{6}{2}\right)=\left(-\dfrac{1}{2},3\right)$

5. $y=2x^2-15$





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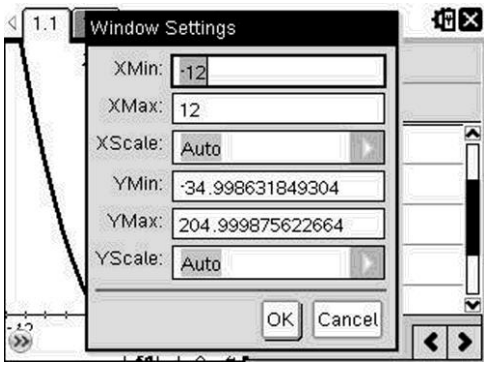


6. $(-4,0),(-3,0),(1,0),(0,24)$

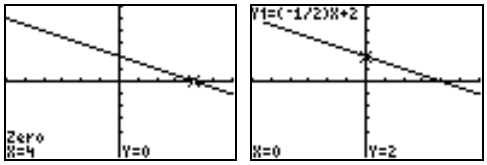
x-intercepts: $-4,-3,1$

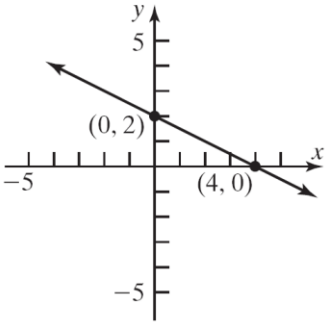
y-intercept: 24

7. $x+2y=4$

$2y=-x+4$

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

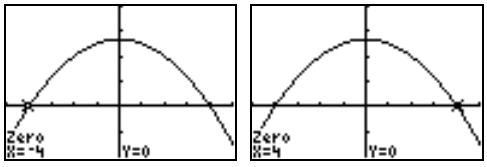


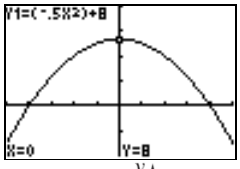


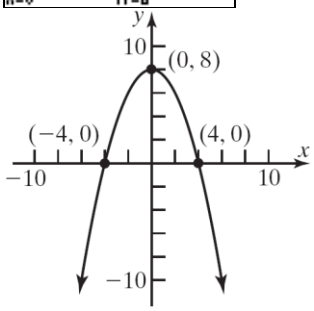
8. $x^2+2y=16$

$2y=-x^2+16$

$y=-\frac{1}{2}x^2+8$







9. $y=5x$

x-intercepts:	*y*-intercepts:
$0=5x$	$y=5(0)$
$0=x$	$y=0$

The only intercept is (0, 0).

Test *x*-axis symmetry: Let $y=-y$

$-y=5x$

$y=-5x$ different

Test *y*-axis symmetry: Let $x=-x$

$y=5(-x)$

$y=-5x$ different

Test origin symmetry: Let $x=-x$ and $y=-y$.

$-y=5(-x)$

$y=5x$ same

Therefore, the graph will have origin symmetry.

10. $9x^2-y^2=9$

x-intercepts:	*y*-intercepts:
$9x^2-(0)^2=9$	$9(0)^2-y^2=9$
$9x^2=9$	$-y^2=9$
$x^2=1$	$y^2=-9$
$x=\pm 1$	no real solutions

The intercepts are $(-1,0)$ and (1, 0).

Test *x*-axis symmetry: Let $y=-y$

$9x^2-(-y)^2=9$

$9x^2-y^2=9$ same

Test *y*-axis symmetry: Let $x=-x$

$9(-x)^2-y^2=9$

$9x^2-y^2=9$ same

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Test origin symmetry: Let $x=-x$ and $y=-y$.

$9(-x)^2-(-y)^2=9$

$9x^2-y^2=9$ same

Therefore, the graph will have *x*-axis, *y*-axis, and origin symmetry.

11. $y=x^4-5x^2-36$

x-intercepts:

$0=x^4-5x^2-36$

$0=(x^2-9)(x^2+4)$

$x^2-9=0$ or $x^2+4=0$

$x^2=9$ $x^2=-4$

$x=\pm 3$ no real sol

y-intercepts:

$y=(0)^4-5(0)^2-36$

$=-36$

The intercepts are (3,0), (-3,0) and (0, -36).

Test *x*-axis symmetry: Let $y=-y$

$-y=x^4-5x^2-36$

$y=-x^4+5x^2+36$ different

Test *y*-axis symmetry: Let $x=-x$

$y=(-x)^4-5(-x)^2-36$

$y=x^4-5x^2-36$ same

Test origin symmetry: Let $x=-x$ and $y=-y$.

$-y=(-x)^4-5(-x)^2-36$

$-y=x^4-5x^2-36$

$y=-x^4+5x^2+36$ different

Therefore, the graph will have *y*-axis symmetry.

12. $x^2+4x+y^2-2y=0$

x-intercepts: $x^2+4x+(0)^2-2(0)=0$

$x^2+4x=0$

$x(x+4)=0$

$x=0,\ x=-4$

y-intercepts: $(0)^2+4(0)+y^2-2y=0$

$y^2-2y=0$

$y(y-2)=0$

$y=0,\ y=2$

The intercepts are $(-4,0)$, $(0,0)$, and $(0,2)$.

Test *x*-axis symmetry: Let $y=-y$

$x^2+4x+(-y)^2-2(-y)=0$

$x^2+4x+y^2+2y=0$ different

Test *y*-axis symmetry: Let $x=-x$

$(-x)^2+4(-x)+y^2-2y=0$

$x^2-4x+y^2-2y=0$ different

Test origin symmetry: Let $x=-x$ and $y=-y$.

$(-x)^2+4(-x)+(-y)^2-2(-y)=0$

$x^2-4x+y^2+2y=0$ different

The graph has none of the indicated symmetries.

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

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

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

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

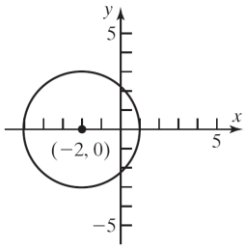
$(x-2)^2+(y-(-4))^2=3^2$

$(x-2)^2+(y+4)^2=9$

15. $(x+2)^2+y^2=9$

$(x+2)^2+y^2=3^2$

Center: (–2, 0); Radius = 3



x-intercepts:

$(x+2)^2+0^2=9$

$(x+2)^2=9$

$x+2=\pm 3$

$x=-2\pm 3$

$x=1$ or $x=-5$

y-intercepts:

$(0+2)^2+y^2=9$

$4+y^2=9$

$y^2=5$

$y=\pm\sqrt{5}$

The intercepts are $(-5,0)$, $(1,0)$, $(0,-\sqrt{5})$, and $(0,\sqrt{5})$.

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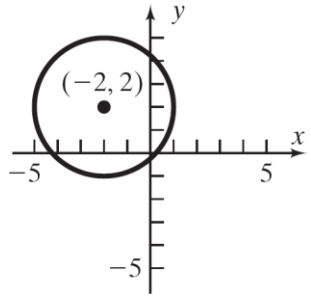
16. $x^2 + y^2 + 4x - 4y - 1 = 0$

$x^2 + 4x + y^2 - 4y = 1$

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

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

Center: (–2, 2) Radius = 3



x-intercepts: $(x+2)^2 + (0-2)^2 = 3^2$

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

$(x+2)^2 = 5$

$x + 2 = \pm\sqrt{5}$

$x = -2 \pm \sqrt{5}$

y-intercepts: $(0+2)^2 + (y-2)^2 = 3^2$

$4 + (y-2)^2 = 9$

$(y-2)^2 = 5$

$y - 2 = \pm\sqrt{5}$

$y = 2 \pm \sqrt{5}$

The intercepts are $(-2-\sqrt{5}, 0)$, $(-2+\sqrt{5}, 0)$, $(0, 2-\sqrt{5})$, and $(0, 2+\sqrt{5})$.

17. Slope = –3; containing (-4, 2)

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

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

$y - 2 = -3x - 12$

$y = -3x - 10$ or $3x + y = -10$

18. Slope = 0; containing the point (2, 1)

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

$y - 1 = 0(x - 2)$

$y - 1 = 0$

$y = 1$

19. Perpendicular to $x + y = 2$

$x + y = 2$

$y = -x + 2$

The slope of this line is -1, so the slope of a line perpendicular to it is 1.

Slope = 1; containing (4,–3)

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

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

$y + 3 = x - 4$

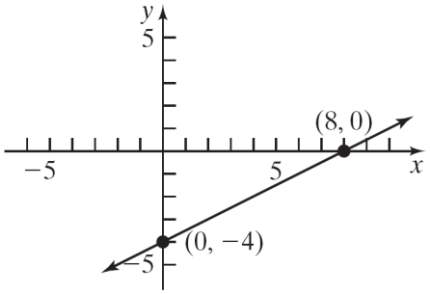
$y = x - 7$ or $x - y = 7$

20. $x - 2y = 8$

x-intercept: $x - 2(0) = 8$, $x = 8$

y-intercept: $0 - 2y = 8$, $y = -4$

The intercepts are $(8, 0)$ and $(0, -4)$.

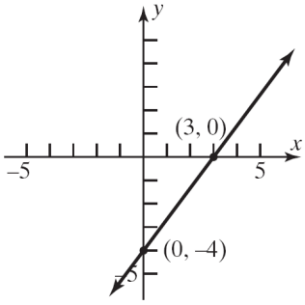


21. $\frac{1}{3}x - \frac{1}{4}y = 1$

x-intercept: $\frac{1}{3}x - \frac{1}{4}(0) = 1$, $\frac{1}{3}x = 1$, $x = 3$

y-intercept: $\frac{1}{3}(0) - \frac{1}{4}y = 1$, $-\frac{1}{4}y = 1$, $y = -4$

The intercepts are $(3, 0)$ and $(0, -4)$.



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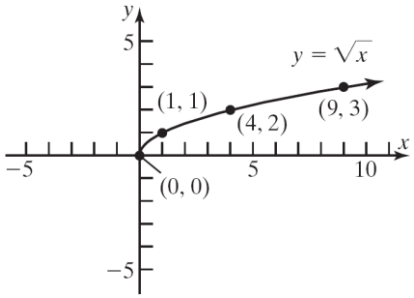
33. $y = \sqrt{x}$



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