حل تجميعة أسئلة وفق الهيكل الوزاري ريفيل

موقع المناهج ← المناهج الإماراتية ← الصف التاسع المتقدم ← رياضيات ← الفصل الأول ← الملف

تاريخ نشر الملف على موقع المناهج: 2023-11-20 04:49:41 || اسم المدرس: فارح أحمد

التواصل الاجتماعي بحسب الصف التاسع المتقدم

روابط مواد الصف التاسع المتقدم على تلغرام

التربية الاسلامية	اللغة العربية	اللغة الانحليزية	الرياضيات

المزيد من الملفات بحسب الصف التاسع المتقدم والمادة رياضيات في الفصل الأول

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مؤسســة الإمــارات للتعلـيم المدرسـي
EMIRATES SCHOOLS ESTABLISHMENT

Grade 9 Advanced Reveal

EOT 1 Coverage solution

Academic Year: 2023-2024

مع تمنيات الأستاذ فارح أحمد للجميع بالنجاح و التفوق

1	Translate equations into sentences	(19-30)	72

Write a sentence for each equation.

19. $j + 16 = 35$

The sum of j and sixteen is thirty-five.

20. $4m = 52$

Four times m is equal to fifty-two.

21. $7(p + 23) = 102$

Seven times the sum of p and twenty-three is the same as one hundred two.

22. $r^2 - 15 = t + 19$

Fifteen less than the square of r equals the sum of t and nineteen.

23. $\frac{2}{5}v + \frac{3}{4} = \frac{2}{3}x^2$

Two fifths of v plus three fourths is identical

24. $\frac{1}{3} - \frac{4}{5}z = \frac{4}{3}y^3$

One third minus four fifths of z is four thirds of y cubed.

25. $g + 10 = 3g$

g plus 10 is the same as 3 times g.

26. $2(t + 4q) = 2q + 4t$

2 times the quantity t plus 4 times q is 2 times q plus 4 times t.

27. $4(a + b) = 9a$

4 times the sum of a and b is 9 times a.

28. $8(2y - 6x) = 4 + 2x$

8 times the quantity 2 times y minus 6 times x equals 4 plus 2 times x.

29. $\frac{1}{2}(f + y) = f - 5$

Half of the sum of f and y is f minus 5.

30. $k^2 - n^2 = 2b$

k squared minus n squared is twice b.

Solve each equation.

7. $18 - (-f) = 91$

SOLUTION:

$$18 - (-f) = 91 \quad \text{Original equation}$$
$$18 + f = 91 \quad \text{Simplify.}$$
$$18 - 18 + f = 91 - 18 \quad \text{Subtract 18 from each side.}$$
$$f = 73 \quad \text{Simplify.}$$

8. $-16 - (-t) = -45$

SOLUTION:

$$-16 - (-t) = -45 \quad \text{Original equation}$$
$$-16 + t = -45 \quad \text{Simplify.}$$
$$-16 + 16 + t = -45 + 16 \quad \text{Add 16 to each side.}$$
$$t = -29 \quad \text{Simplify.}$$

9. $\frac{1}{3}v = -5$

SOLUTION:

$$\frac{1}{3}v = -5 \quad \text{Original equation}$$
$$\left(\frac{3}{1}\right)\frac{1}{3}v = \left(\frac{3}{1}\right)(-5) \quad \text{Multiply each side by 3.}$$
$$v = -15 \quad \text{Simplify.}$$

10. $\frac{u}{8} = -4$

SOLUTION:

$$\frac{u}{8} = -4 \quad \text{Original equation}$$
$$(8)\frac{u}{8} = (8)(-4) \quad \text{Multiply each side by 8.}$$
$$u = -32 \quad \text{Simplify.}$$

11. $\frac{a}{6} = -9$

SOLUTION:

$$\frac{a}{6} = -9 \quad \text{Original equation}$$
$$(6)\left(\frac{a}{6}\right) = (6)(-9) \quad \text{Multiply each side by 6.}$$
$$a = -54 \quad \text{Simplify.}$$

12. $-\frac{k}{5} = \frac{7}{5}$

SOLUTION:

$$-\frac{k}{5} = \frac{7}{5} \quad \text{Original equation}$$
$$(-5)\left(-\frac{k}{5}\right) = (-5)\left(\frac{7}{5}\right) \quad \text{Multiply each side by } -5.$$
$$k = -7 \quad \text{Simplify.}$$

13. $\frac{3}{4} = w + \frac{2}{5}$

SOLUTION:

$$\frac{3}{4} = w + \frac{2}{5} \quad \text{Original equation}$$
$$\frac{3}{4} - \frac{2}{5} = w + \frac{2}{5} - \frac{2}{5} \quad \text{Subtract } \frac{2}{5} \text{ from each side.}$$
$$\frac{7}{20} = w \quad \text{Simplify.}$$

14. $-\frac{1}{2} + a = \frac{5}{8}$

SOLUTION:

$$-\frac{1}{2} + a = \frac{5}{8} \quad \text{Original equation}$$
$$-\frac{1}{2} + \frac{1}{2} + a = \frac{5}{8} + \frac{1}{2} \quad \text{Add } \frac{1}{2} \text{ to each side.}$$
$$a = 1\frac{1}{8} \quad \text{Simplify.}$$

15. $-\frac{t}{7} = \frac{1}{15}$

SOLUTION:

$$-\frac{t}{7} = \frac{1}{15} \quad \text{Original equation}$$
$$(-7)\left(-\frac{t}{7}\right) = (-7)\frac{1}{15} \quad \text{Multiply each side by } -7.$$
$$t = -\frac{7}{15} \quad \text{Simplify.}$$

16. $-\frac{5}{7} = y - 2$

SOLUTION:

$$-\frac{5}{7} = y - 2 \quad \text{Original equation}$$
$$-\frac{5}{7} + 2 = y - 2 + 2 \quad \text{Add 2 to each side.}$$
$$1\frac{2}{7} = y \quad \text{Simplify.}$$

17. $v + 914 = -23$

SOLUTION:

$$v + 914 = -23 \quad \text{Original equation}$$
$$v + 914 - 914 = -23 - 914 \quad \text{Subtract 914 from each side.}$$
$$v = -937 \quad \text{Simplify.}$$

18. $447 + x = -261$

SOLUTION:

$$447 + x = -261 \quad \text{Original equation}$$
$$447 - 447 + x = -261 - 447 \quad \text{Subtract 447 from each side.}$$
$$x = -708 \quad \text{Simplify.}$$

Solve each equation for x. Assume $a \neq 0$.

18. $ax + 3 = 23$

SOLUTION:

$ax + 3 = 23$	Original equation
$ax + 3 - 3 = 23 - 3$	Subtract 3 from each side.
$ax = 20$	Simplify.
$\dfrac{ax}{a} = \dfrac{20}{a}$	Divide each side by a.
$x = \dfrac{20}{a}$	Simplify.

19. $4 = ax - 14$

SOLUTION:

$4 = ax - 14$	Original equation
$4 + 14 = ax - 14 + 14$	Add 14 to each side.
$18 = ax$	Simplify.
$\dfrac{18}{a} = \dfrac{ax}{a}$	Divide each side by a.
$\dfrac{18}{a} = x$	Simplify.

20. $ax - 5 = 19$

SOLUTION:

$ax - 5 = 19$	Original equation
$ax - 5 + 5 = 19 + 5$	Add 5 to each side.
$ax = 24$	Simplify.
$\dfrac{ax}{a} = \dfrac{24}{a}$	Divide each side by a.
$x = \dfrac{24}{a}$	Simplify.

21. $6 + ax = -29$

SOLUTION:

$6 + ax = -29$	Original equation
$6 - 6 + ax = -29 - 6$	Subtract 6 from each side.
$ax = -35$	Simplify.
$\dfrac{ax}{a} = \dfrac{-35}{a}$	Divide each side by a.
$x = \dfrac{-35}{a}$	Simplify.

22. $\dfrac{8}{ax} - 5 = -3$

SOLUTION:

$\dfrac{8}{ax} - 5 = -3$	Original equation
$\dfrac{8}{ax} - 5 + 5 = -3 + 5$	Add 5 to each side.
$\dfrac{8}{ax} = 2$	Simplify.
$(ax)\dfrac{8}{ax} = (ax)2$	Multiply each side by ax.
$8 = 2ax$	Simplify.
$\dfrac{8}{2a} = \dfrac{2ax}{2a}$	Divide each side by $2a$.
$\dfrac{4}{a} = x$	Simplify.

23. $18 - ax = 42$

SOLUTION:

$18 - ax = 42$	Original equation
$18 - 18 - ax = 42 - 18$	Subtract 18 from each side.
$-ax = 24$	Simplify.
$\dfrac{-ax}{-a} = \dfrac{24}{-a}$	Divide each side by $-a$.
$x = \dfrac{-24}{a}$	Simplify.

24. $5 = \dfrac{5}{ax} + 1$

SOLUTION:

$5 = \dfrac{5}{ax} + 1$	Original equation
$5 - 1 = \dfrac{5}{ax} + 1 - 1$	Subtract 1 from each side.
$4 = \dfrac{5}{ax}$	Simplify.
$(ax)4 = (ax)\dfrac{5}{ax}$	Multiply each side by ax.
$4ax = 5$	Simplify.
$\dfrac{4ax}{4a} = \dfrac{5}{4a}$	Divide each side by $4a$.
$a = \dfrac{5}{4a}$	Simplify.

25. $-3 = ax + 11$

SOLUTION:

$-3 = ax + 11$	Original equation
$-3 - 11 = ax + 11 - 11$	Subtract 11 from each side.
$-14 = ax$	Simplify.
$\dfrac{-14}{a} = \dfrac{ax}{a}$	Divide each side by a.
$\dfrac{-14}{a} = x$	Simplify.

26. $-7 = -ax - 16$

SOLUTION:

$-7 = -ax - 16$	Original equation
$-7 + 16 = -ax - 16 + 16$	Add 16 to each side.
$9 = -ax$	Simplify.
$\dfrac{9}{-a} = \dfrac{-ax}{-a}$	Divide each side by $-a$.
$\dfrac{-9}{a} = x$	Simplify.

Solve each equation. Check your solution.

27. $3x + 8 = 29$

SOLUTION:

$$3x + 8 = 29 \quad \text{Original equation}$$
$$3x + 8 - 8 = 29 - 8 \quad \text{Subtract 8 from each side.}$$
$$3x = 21 \quad \text{Simplify.}$$
$$\frac{3x}{3} = \frac{21}{3} \quad \text{Divide each side by 3.}$$
$$x = 7 \quad \text{Simplify.}$$

28. $\frac{a}{6} - 5 = 9$

SOLUTION:

$$\frac{a}{6} - 5 = 9 \quad \text{Original equation}$$
$$\frac{a}{6} - 5 + 5 = 9 + 5 \quad \text{Add 5 to each side.}$$
$$\frac{a}{6} = 14 \quad \text{Simplify.}$$
$$(6)\frac{a}{6} = (6)14 \quad \text{Multiply each side by 6.}$$
$$a = 84 \quad \text{Simplify.}$$

29. $\frac{5r}{2} - 6 = 19$

SOLUTION:

$$\frac{5r}{2} - 6 = 19 \quad \text{Original equation}$$
$$\frac{5r}{2} - 6 + 6 = 19 + 6 \quad \text{Add 6 to each side.}$$
$$\frac{5r}{2} = 25 \quad \text{Simplify.}$$
$$\left(\frac{2}{5}\right)\frac{5r}{2} = \left(\frac{2}{5}\right)25 \quad \text{Multiply each side by } \frac{2}{5}.$$
$$r = 10 \quad \text{Simplify.}$$

30. $\frac{n}{3} - 8 = -2$

SOLUTION:

$$\frac{n}{3} - 8 = -2 \quad \text{Original equation}$$
$$\frac{n}{3} - 8 + 8 = -2 + 8 \quad \text{Add 8 to each side.}$$
$$\frac{n}{3} = 6 \quad \text{Simplify.}$$
$$(3)\frac{n}{3} = (3)6 \quad \text{Multiply each side by 3.}$$
$$n = 18 \quad \text{Simplify.}$$

31. $5 + \frac{x}{4} = 1$

SOLUTION:

$$5 + \frac{x}{4} = 1 \quad \text{Original equation}$$
$$5 - 5 + \frac{x}{4} = 1 - 5 \quad \text{Subtract 5 from each side.}$$
$$\frac{x}{4} = -4 \quad \text{Simplify.}$$
$$(4)\frac{x}{4} = (4)(-4) \quad \text{Multiply each side by 4.}$$
$$x = -16 \quad \text{Simplify.}$$

32. $-\frac{h}{3} - 4 = 13$

SOLUTION:

$$-\frac{h}{3} - 4 = 13 \quad \text{Original equation}$$
$$-\frac{h}{3} - 4 + 4 = 13 + 4 \quad \text{Add 4 to each side.}$$
$$-\frac{h}{3} = 17 \quad \text{Simplify.}$$
$$(-3)\left(-\frac{h}{3}\right) = (-3)17 \quad \text{Multiply each side by } -3.$$
$$h = -51 \quad \text{Simplify.}$$

33. $5(1 + n) = -5$

SOLUTION:

$$5(1 + n) = -5 \quad \text{Original equation}$$
$$\frac{5(1+n)}{5} = \frac{-5}{5} \quad \text{Divide each side by 5.}$$
$$1 + n = -1 \quad \text{Simplify.}$$
$$1 - 1 + n = -1 - 1 \quad \text{Subtract 1 from each side.}$$
$$n = -2 \quad \text{Simplify.}$$

34. $-27 = -6 - 3p$

SOLUTION:

$$-27 = -6 - 3p \quad \text{Original equation}$$
$$-27 + 6 = -6 + 6 - 3p \quad \text{Add 6 to each side.}$$
$$-21 = -3p \quad \text{Simplify.}$$
$$\frac{-21}{-3} = \frac{-3p}{-3} \quad \text{Divide each side by } -3.$$
$$7 = p \quad \text{Simplify.}$$

35. $-\frac{a}{6} + 5 = 2$

SOLUTION:

$$-\frac{a}{6} + 5 = 2 \quad \text{Original equation}$$
$$-\frac{a}{6} + 5 - 5 = 2 - 5 \quad \text{Subtract 5 from each side.}$$
$$-\frac{a}{6} = -3 \quad \text{Simplify.}$$
$$(-6)\left(-\frac{a}{6}\right) = (-6)(-3) \quad \text{Multiply each side by } -6.$$
$$a = 18 \quad \text{Simplify.}$$

Solve each equation.

11. $|7 - 2q| = 3$

SOLUTION:

Case 1: If q is nonnegative, then $|q| = q$.

$7 - 2q = 3$	Original equation
$7 - 7 - 2q = 3 - 7$	Subtract 7 from each side.
$-2q = -4$	Simplify.
$\dfrac{-2q}{-2} = \dfrac{-4}{-2}$	Divide each side by -2.
$q = 2$	Simplify.

Case 2: If q is negative, then $|q| = -q$.

$7 - 2q = -3$	Original equation
$7 - 7 - 2q = -3 - 7$	Subtract 7 from each side.
$-2q = -10$	Simplify.
$\dfrac{-2q}{-2} = \dfrac{-10}{-2}$	Divide each side by -2.
$q = 5$	Simplify.

The solution set is {2, 5}.

12. $|4x - 2| = 26$

SOLUTION:

Case 1: If x is nonnegative, then $|x| = x$.

$4x - 2 = 26$	Original equation
$4x - 2 + 2 = 26 + 2$	Add 2 to each side.
$4x = 28$	Simplify.
$\dfrac{4x}{4} = \dfrac{28}{4}$	Divide each side by 4.
$x = 7$	Simplify.

Case 2: If x is negative, then $|x| = -x$.

$4x - 2 = -26$	Original equation
$4x - 2 + 2 = -26 + 2$	Add 2 to each side.
$4x = -22$	Simplify.
$\dfrac{4x}{4} = \dfrac{-24}{4}$	Divide each side by 4.
$x = -6$	Simplify.

The solution set is {–6, 7}.

13. $|w + 1| = 5$

SOLUTION:

Case 1: If w is nonnegative, then $|w| = w$.

$w + 1 = 5$	Original equation
$w + 1 - 1 = 5 - 1$	Subtract 1 from each side.
$w = 4$	Simplify.

Case 2: If w is negative, then $|w| = -w$.

$w + 1 = -5$	Original equation
$w + 1 - 1 = -5 - 1$	Subtract 1 from each side.
$w = -6$	Simplify.

The solution set is {–6, 4}.

14. $|n + 2| = -1$

SOLUTION:

$|n + 2| = -1$ means that the distance between n and -2 is -1.

Since distance cannot be negative, the solution is the empty set Ø.
The solution set is Ø.

15. $|m - 2| = 2$

SOLUTION:

Case 1: If m is nonnegative, then $|m| = m$.

$m - 2 = 2$	Original equation
$m - 2 + 2 = 2 + 2$	Add 2 to each side.
$m = 4$	Simplify.

Case 2: If m is negative, then $|m| = -m$.

$m - 2 = -2$	Original equation
$m - 2 + 2 = -2 + 2$	Add 2 to each side.
$m = 0$	Simplify.

The solution set is {0, 4}.

16. $|5c - 3| = 1$

SOLUTION:

Case 1: If c is nonnegative, then $|c| = c$.

$5c - 3 = 1$	Original equation
$5c - 3 + 3 = 1 + 3$	Add 3 to each side.
$5c = 4$	Simplify.
$\dfrac{5c}{5} = \dfrac{4}{5}$	Divide each side by 5.
$c = \dfrac{4}{5}$	Simplify.

Case 2: If c is negative, then $|c| = -c$.

$5c - 3 = -1$	Original equation
$5c - 3 + 3 = -1 + 3$	Add 3 to each side.
$5c = 2$	Simplify.
$\dfrac{5c}{5} = \dfrac{2}{5}$	Divide each side by 5.
$c = \dfrac{2}{5}$	Simplify.

The solution set is $\left\{\dfrac{2}{5}, \dfrac{4}{5}\right\}$.

17. $|2t + 6| = 4$

SOLUTION:

Case 1: If t is nonnegative, then $|t| = t$.

$$2t + 6 = 4 \qquad \text{Original equation}$$
$$2t + 6 - 6 = 4 - 6 \qquad \text{Subtract 6 from each side.}$$
$$2t = -2 \qquad \text{Simplify.}$$
$$\frac{2t}{2} = \frac{-2}{2} \qquad \text{Divide each side by 2.}$$
$$t = -1 \qquad \text{Simplify.}$$

Case 2: If t is negative, then $|t| = -t$.

$$2t + 6 = 4 \qquad \text{Original equation}$$
$$2t + 6 - 6 = -4 - 6 \qquad \text{Subtract 6 from each side.}$$
$$2t = -10 \qquad \text{Simplify.}$$
$$\frac{2t}{2} = \frac{-10}{2} \qquad \text{Divide each side by 2.}$$
$$t = -5 \qquad \text{Simplify.}$$

The solution set is $\{-5, -1\}$.

18. $|8k - 5| = -4$

SOLUTION:

$|8k - 5| = -4$ means that the distance between $8k$ and 5 is -4.

Since distance cannot be negative, the solution is the empty set $\varnothing$. The solution set is $\varnothing$.

5	Solve proportions.	(19-28)	113

Solve each proportion. If necessary, round to the nearest hundredth.

19. $\dfrac{4v + 7}{15} = \dfrac{6v + 2}{10}$

SOLUTION:

$$\frac{4v + 7}{15} = \frac{6v + 2}{10} \qquad \text{Original proportion}$$
$$15\left(\frac{4v + 7}{15}\right) = 15\left(\frac{6v + 2}{10}\right) \qquad \text{Multiply each side by 15.}$$
$$4v + 7 = \frac{15(6v + 2)}{10} \qquad \text{Simplify.}$$
$$4v + 7 = \frac{90v + 30}{10} \qquad \text{Distributive Property}$$
$$10(4v + 7) = 10\left(\frac{90v + 30}{10}\right) \qquad \text{Multiply each side by 10.}$$
$$10(4v + 7) = 90v + 30 \qquad \text{Simplify.}$$
$$40v + 70 = 90v + 30 \qquad \text{Distributive Property}$$
$$40v + 70 - 30 = 90v + 30 - 30 \qquad \text{Subtract 30 from each side.}$$
$$40v + 40 = 90v \qquad \text{Simplify.}$$
$$40v - 40v + 40 = 90v - 40v \qquad \text{Subtract 40v from each side.}$$
$$40 = 50v \qquad \text{Simplify.}$$
$$\frac{40}{50} = \frac{50v}{50} \qquad \text{Divide each side by 50.}$$
$$0.8 = v \qquad \text{Simplify.}$$

20. $\dfrac{9b - 3}{9} = \dfrac{5b + 5}{3}$

SOLUTION:

$$\frac{9b - 3}{9} = \frac{5b + 5}{3} \qquad \text{Original proportion}$$
$$9\left(\frac{9b - 3}{9}\right) = 9\left(\frac{5b + 5}{3}\right) \qquad \text{Multiply each side by 9.}$$
$$9b - 3 = 3(5b + 5) \qquad \text{Simplify.}$$
$$9b - 3 = 15b + 15 \qquad \text{Distributive Property}$$
$$9b - 3 - 15 = 15b + 15 - 15 \qquad \text{Subtract 15 from each side.}$$
$$9b - 18 = 15b \qquad \text{Simplify.}$$
$$9b - 9b - 18 = 15b - 9b \qquad \text{Subtract 9b from each side.}$$
$$-18 = 6b \qquad \text{Simplify.}$$
$$\frac{-18}{6} = \frac{6b}{6} \qquad \text{Divide each side by 6.}$$
$$-3 = b \qquad \text{Simplify.}$$

21. $\dfrac{2n-4}{5} = \dfrac{3n+3}{10}$

SOLUTION:

$$\dfrac{2n-4}{5} = \dfrac{3n+3}{10} \qquad \text{Original proportion}$$

$$10\left(\dfrac{2n-4}{5}\right) = 10\left(\dfrac{3n+3}{10}\right) \qquad \text{Multiply each side by 10.}$$

$$2(2n-4) = 3n+3 \qquad \text{Simplify.}$$

$$4n-8 = 3n+3 \qquad \text{Distributive Property}$$

$$4n-8+8 = 3n+3+8 \qquad \text{Add 8 to each side.}$$

$$4n = 3n+11 \qquad \text{Simplify.}$$

$$4n-3n = 3n-3n+11 \qquad \text{Subtract } 3n \text{ from each side.}$$

$$n = 11 \qquad \text{Simplify.}$$

22. $\dfrac{2}{g+6} = \dfrac{4}{5g+10}$

SOLUTION:

$$\dfrac{2}{g+6} = \dfrac{4}{5g+10} \qquad \text{Original proportion}$$

$$(g+6)\left(\dfrac{2}{g+6}\right) = (g+6)\left(\dfrac{4}{5g+10}\right) \qquad \text{Multiply each side by } g+6.$$

$$2 = \dfrac{4(g+6)}{5g+10} \qquad \text{Simplify.}$$

$$2 = \dfrac{4g+24}{5g+10} \qquad \text{Distributive Property}$$

$$(5g+10)(2) = (5g+10)\left(\dfrac{4g+24}{5g+10}\right) \qquad \text{Multiply each side by } 5g+10.$$

$$2(5g+10) = 4g+24 \qquad \text{Simplify.}$$

$$10g+20 = 4g+24 \qquad \text{Distributive Property}$$

$$10g+20-20 = 4g+24-20 \qquad \text{Subtract 20 from each side.}$$

$$10g = 4g+4 \qquad \text{Simplify.}$$

$$10g-4g = 4g-4g+4 \qquad \text{Subtract } 4g \text{ from each side.}$$

$$6g = 4 \qquad \text{Simplify.}$$

$$\dfrac{6g}{6} = \dfrac{4}{6} \qquad \text{Divide each side by 6.}$$

$$g = 0.67 \qquad \text{Simplify.}$$

23. $\dfrac{x}{3} = \dfrac{3x+2}{6}$

SOLUTION:

$$\dfrac{x}{3} = \dfrac{3x+2}{6} \qquad \text{Original proportion}$$

$$6\left(\dfrac{x}{3}\right) = 6\left(\dfrac{3x+2}{6}\right) \qquad \text{Multiply each side by 6.}$$

$$2x = 3x+2 \qquad \text{Simplify.}$$

$$2x-3x = 3x-3x+2 \qquad \text{Subtract } 3x \text{ from each side.}$$

$$-x = 2 \qquad \text{Simplify.}$$

$$\dfrac{-x}{-1} = \dfrac{2}{-1} \qquad \text{Divide each side by } -1.$$

$$x = -2 \qquad \text{Simplify.}$$

24. $\dfrac{w+3}{7} = \dfrac{w-1}{8}$

SOLUTION:

$$\dfrac{w+3}{7} = \dfrac{w-1}{8} \qquad \text{Original proportion}$$

$$7\left(\dfrac{w+3}{7}\right) = 7\left(\dfrac{w-1}{8}\right) \qquad \text{Multiply each side by 7.}$$

$$w+3 = \dfrac{7(w-1)}{8} \qquad \text{Simplify.}$$

$$w+3 = \dfrac{7w-7}{8} \qquad \text{Distributive Property}$$

$$8(w+3) = 8\left(\dfrac{7w-7}{8}\right) \qquad \text{Multiply each side by 8.}$$

$$8(w+3) = 7w-7 \qquad \text{Simplify.}$$

$$8w+24 = 7w-7 \qquad \text{Distributive Property}$$

$$8w+24-24 = 7w-7-24 \qquad \text{Subtract 24 from each side.}$$

$$8w = 7w-31 \qquad \text{Simplify.}$$

$$8w-7w = 7w-7w-31 \qquad \text{Subtract } 7w \text{ from each side.}$$

$$w = -31 \qquad \text{Simplify.}$$

25. $\dfrac{4q-3}{5} = \dfrac{2q+1}{7}$

SOLUTION:

$$\dfrac{4q-3}{5} = \dfrac{2q+1}{7} \qquad \text{Original proportion}$$

$$5\left(\dfrac{4q-3}{5}\right) = 5\left(\dfrac{2q+1}{7}\right) \qquad \text{Multiply each side by 5.}$$

$$4q-3 = \dfrac{5(2q+1)}{7} \qquad \text{Simplify.}$$

$$4q-3 = \dfrac{10q+5}{7} \qquad \text{Distributive Property}$$

$$7(4q-3) = 7\left(\dfrac{10q+5}{7}\right) \qquad \text{Multiply each side by 7.}$$

$$7(4q-3) = 10q+5 \qquad \text{Simplify.}$$

$$28q-21 = 10q+5 \qquad \text{Distributive Property}$$

$$28q-21+21 = 10q+5+21 \qquad \text{Add 21 to each side.}$$

$$28q = 10q+26 \qquad \text{Simplify.}$$

$$28q-10q = 10q-10q+26 \qquad \text{Subtract } 10q \text{ from each side.}$$

$$18q = 26 \qquad \text{Simplify.}$$

$$\dfrac{18q}{18} = \dfrac{26}{18} \qquad \text{Divide each side by 18.}$$

$$q = 1.44 \qquad \text{Simplify.}$$

26. $\dfrac{5}{7k+4} = \dfrac{2}{2k-3}$

SOLUTION:

$$\dfrac{5}{7k+4} = \dfrac{2}{2k-3} \qquad \text{Original proportion}$$

$$(7k+4)\left(\dfrac{5}{7k+4}\right) = (7k+4)\left(\dfrac{2}{2k-3}\right) \qquad \text{Multiply each side by } 7k+4.$$

$$5 = \dfrac{2(7k+4)}{2k-3} \qquad \text{Simplify.}$$

$$5 = \dfrac{14k+8}{2k-3} \qquad \text{Distributive Property}$$

$$(2k-3)(5) = (2k-3)\left(\dfrac{14k+8}{2k-3}\right) \qquad \text{Multiply each side by } 2k-3.$$

$$5(2k-3) = 14k+8 \qquad \text{Simplify.}$$

$$10k-15 = 14k+8 \qquad \text{Distributive Property}$$

$$10k-15-8 = 14k+8-8 \qquad \text{Subtract 8 from each side.}$$

$$10k-23 = 14k \qquad \text{Simplify.}$$

$$10k-10k-23 = 14k-10k \qquad \text{Subtract } 10k \text{ from each side.}$$

$$-23 = 4k \qquad \text{Simplify.}$$

$$\dfrac{-23}{4} = \dfrac{4k}{4} \qquad \text{Divide each side by 4.}$$

$$-5.75 = k \qquad \text{Simplify.}$$

27. $\dfrac{m+1}{9} = \dfrac{m+2}{2}$

SOLUTION:

$$\dfrac{m+1}{9} = \dfrac{m+2}{2} \qquad \text{Original proportion}$$

$$9\left(\dfrac{m+1}{9}\right) = 9\left(\dfrac{m+2}{2}\right) \qquad \text{Multiply each side by 9.}$$

$$m+1 = \dfrac{9(m+2)}{2} \qquad \text{Simplify.}$$

$$m+1 = \dfrac{9m+18}{2} \qquad \text{Distributive Property}$$

$$2(m+1) = 2\left(\dfrac{9m+18}{2}\right) \qquad \text{Multiply each side by 2.}$$

$$2(m+1) = 9m+18 \qquad \text{Simplify.}$$

$$2m+2 = 9m+18 \qquad \text{Distributive Property}$$

$$2m+2-18 = 9m+18-18 \qquad \text{Subtract 18 from each side.}$$

$$2m-16 = 9m \qquad \text{Simplify.}$$

$$2m-2m-16 = 9m-2m \qquad \text{Subtract } 2m \text{ from each side.}$$

$$-16 = 7m \qquad \text{Simplify.}$$

$$\dfrac{-16}{7} = \dfrac{7m}{7} \qquad \text{Divide each side by 7.}$$

$$-2.29 = m \qquad \text{Simplify.}$$

28. $\dfrac{j-5}{2} = \dfrac{j+8}{7}$

SOLUTION:

$$\dfrac{j-5}{2} = \dfrac{j+8}{7} \qquad \text{Original proportion}$$

$$2\left(\dfrac{j-5}{2}\right) = 2\left(\dfrac{j+8}{7}\right) \qquad \text{Multiply each side by 2.}$$

$$j-5 = \dfrac{2(j+8)}{7} \qquad \text{Simplify.}$$

$$j-5 = \dfrac{2j+16}{7} \qquad \text{Distributive Property}$$

$$7(j-5) = 7\left(\dfrac{2j+16}{7}\right) \qquad \text{Multiply each side by 7.}$$

$$7(j-5) = 2j+16 \qquad \text{Simplify.}$$

$$7j-35 = 2j+16 \qquad \text{Distributive Property}$$

$$7j-35+35 = 2j+16+35 \qquad \text{Add 35 to each side.}$$

$$7j = 2j+51 \qquad \text{Simplify.}$$

$$7j-2j = 2j-2j+51 \qquad \text{Subtract } 2j \text{ from each side.}$$

$$5j = 51 \qquad \text{Simplify.}$$

$$\dfrac{5j}{5} = \dfrac{51}{5} \qquad \text{Divide each side by 5.}$$

$$j = 10.2 \qquad \text{Simplify.}$$

38. $(12, 10), (-2, r), m = -4$ e that passes through each pair

SOLUTION:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$ Use the Slope Formula.

$$-4 = \frac{r - 10}{-2 - 12}$$ $(12, 10) = (x_1, y_1)$ and $(-2, r) = (x_2, y_2)$

$$-4 = \frac{r - 10}{-14}$$ Subtract.

$$-14(-4) = \frac{-14(r - 10)}{-14}$$ Multiply each side by -14.

$$56 = r - 10$$ Simplify.

$$56 + 10 = r - 10 + 10$$ Add 10 to each side.

$$66 = r$$ Simplify.

39. $(r, -5), (3, 13), m = 8$

SOLUTION:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$ Use the Slope Formula.

$$8 = \frac{13 - (-5)}{3 - r}$$ $(r, -5) = (x_1, y_1)$ and $(3, 13) = (x_2, y_2)$

$$8 = \frac{18}{3 - r}$$ Subtract.

$$(3 - r)(8) = \frac{(3 - r)18}{3 - r}$$ Multiply each side by $3 - r$.

$$24 - 8r = 18$$ Distributive Property

$$24 - 24 - 8r = 18 - 24$$ Subtract 24 from each side.

$$-8r = -6$$ Simplify.

$$\frac{-8r}{-8} = \frac{-6}{-8}$$ Divide each side by -8.

$$r = \frac{3}{4}$$ Simplify.

40. $(3, 5), (-3, r), m = \frac{3}{4}$

SOLUTION:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$ Use the Slope Formula.

$$\frac{3}{4} = \frac{r - 5}{-3 - 3}$$ $(3, 5) = (x_1, y_1)$ and $(-3, r) = (x_2, y_2)$

$$\frac{3}{4} = \frac{r - 5}{-6}$$ Subtract.

$$-6\left(\frac{3}{4}\right) = \frac{-6(r - 5)}{-6}$$ Multiply each side by -6.

$$-\frac{9}{2} = r - 5$$ Simplify.

$$-\frac{9}{2} + 5 = r - 5 + 5$$ Add 5 to each side.

$$\frac{1}{2} = r$$ Simplify.

41. $(-2, 8), (r, 4), m = -\frac{1}{2}$

SOLUTION:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$ Use the Slope Formula.

$$-\frac{1}{2} = \frac{4 - 8}{r - (-2)}$$ $(-2, 8) = (x_1, y_1)$ and $(r, 4) = (x_2, y_2)$

$$-\frac{1}{2} = \frac{-4}{r + 2}$$ Subtract.

$$(r + 2)\left(-\frac{1}{2}\right) = \frac{(r + 2)(-4)}{r + 2}$$ Multiply each side by $r + 2$.

$$-\frac{1}{2}r - 1 = -4$$ Distributive Property

$$-\frac{1}{2}r - 1 + 1 = -4 + 1$$ Add 1 to each side.

$$-\frac{1}{2}r = -3$$ Simplify.

$$\frac{-\frac{1}{2}r}{-\frac{1}{2}} = \frac{-3}{-\frac{1}{2}}$$ Divide each side by $-\frac{1}{2}$.

$$r = 6$$ Simplify.

42. $(r, 3), (5, 9), m = 2$

SOLUTION:

$$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad \text{Use the Slope Formula.}$$

$$2 = \frac{9 - 3}{5 - r} \qquad (r, 3) = (x_1, y_1) \text{ and } (5, 9) = (x_2, y_2)$$

$$2 = \frac{6}{5 - r} \qquad \text{Subtract.}$$

$$(5 - r)(2) = \frac{(5 - r)6}{5 - r} \qquad \text{Multiply each side by } 5 - r.$$

$$10 - 2r = 6 \qquad \text{Distributive Property}$$

$$10 - 10 - 2r = 6 - 10 \qquad \text{Subtract 10 from each side.}$$

$$-2r = -4 \qquad \text{Simplify.}$$

$$\frac{-2r}{-2} = \frac{-4}{-2} \qquad \text{Divide each side by } -2.$$

$$r = 2 \qquad \text{Simplify.}$$

43. $(5, 9), (r, -3), m = -4$

SOLUTION:

$$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad \text{Use the Slope Formula.}$$

$$-4 = \frac{-3 - 9}{r - 5} \qquad (5, 9) = (x_1, y_1) \text{ and } (r, -3) = (x_2, y_2)$$

$$-4 = \frac{-12}{r - 5} \qquad \text{Subtract.}$$

$$(r - 5)(-4) = \frac{(r - 5)(-12)}{r - 5} \qquad \text{Multiply each side by } r - 5.$$

$$-4r + 20 = -12 \qquad \text{Distributive Property}$$

$$-4r + 20 - 20 = -12 - 20 \qquad \text{Subtract 20 from each side.}$$

$$-4r = -32 \qquad \text{Simplify.}$$

$$\frac{-4r}{-4} = \frac{-32}{-4} \qquad \text{Divide each side by } -4.$$

$$r = 8 \qquad \text{Simplify.}$$

44. $(r, 2), (6, 3), m = \frac{1}{2}$

SOLUTION:

$$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad \text{Use the Slope Formula.}$$

$$\frac{1}{2} = \frac{3 - 2}{6 - r} \qquad (r, 2) = (x_1, y_1) \text{ and } (6, 3) = (x_2, y_2)$$

$$\frac{1}{2} = \frac{1}{6 - r} \qquad \text{Subtract.}$$

$$(6 - r)\left(\frac{1}{2}\right) = \frac{(6 - r)1}{6 - r} \qquad \text{Multiply each side by } 6 - r.$$

$$3 - \frac{1}{2}r = 1 \qquad \text{Distributive Property}$$

$$3 - 3 - \frac{1}{2}r = 1 - 3 \qquad \text{Subtract 3 from each side.}$$

$$-\frac{1}{2}r = -2 \qquad \text{Simplify.}$$

$$\frac{-\frac{1}{2}r}{-\frac{1}{2}} = \frac{-2}{-\frac{1}{2}} \qquad \text{Divide each side by } -\frac{1}{2}.$$

$$r = 4 \qquad \text{Simplify.}$$

45. $(r, 4), (7, 1), m = \frac{3}{4}$

SOLUTION:

$$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad \text{Use the Slope Formula.}$$

$$\frac{3}{4} = \frac{1 - 4}{7 - r} \qquad (r, 4) = (x_1, y_1) \text{ and } (7, 1) = (x_2, y_2)$$

$$\frac{3}{4} = \frac{-3}{7 - r} \qquad \text{Subtract.}$$

$$(7 - r)\left(\frac{3}{4}\right) = \frac{(7 - r)(-3)}{7 - r} \qquad \text{Multiply each side by } 7 - r.$$

$$\frac{21}{4} - \frac{3}{4}r = -3 \qquad \text{Distributive Property}$$

$$\frac{21}{4} - \frac{21}{4} - \frac{3}{4}r = -3 - \frac{21}{4} \qquad \text{Subtract } \frac{21}{4} \text{ from each side.}$$

$$-\frac{3}{4}r = -\frac{33}{4} \qquad \text{Simplify.}$$

$$\frac{-\frac{3}{4}r}{-\frac{3}{4}} = \frac{-\frac{33}{4}}{-\frac{3}{4}} \qquad \text{Divide each side by } -\frac{3}{4}.$$

$$r = 11 \qquad \text{Simplify.}$$

Describe the dilation in each function as it relates to the graph of the parent function.
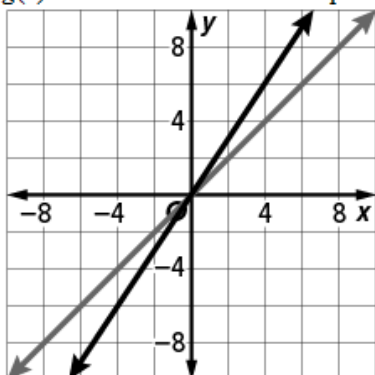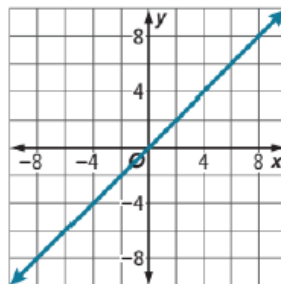
10. $g(x) = 5(x)$
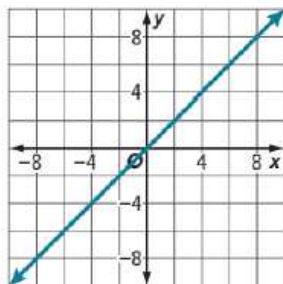
ANSWER:

$g(x)$ is a vertical stretch of the parent function by a factor of 5
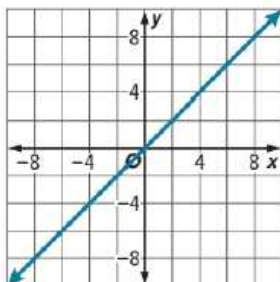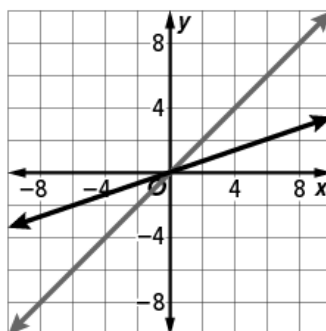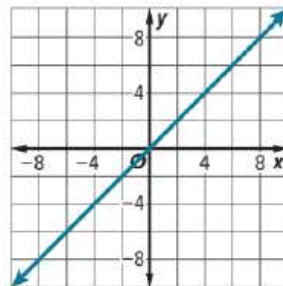

11. $g(x) = \frac{1}{3}(x)$

ANSWER:

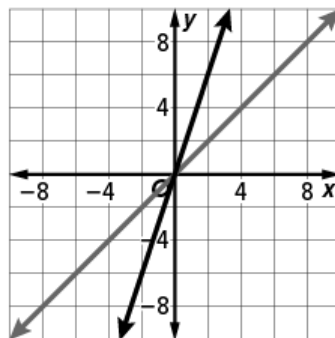$g(x)$ is a vertical compression of the parent function by a factor of $\frac{1}{3}$
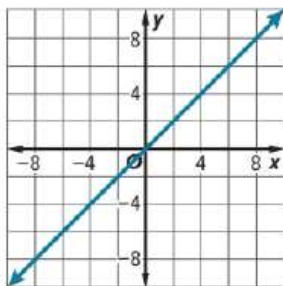

12. $g(x) = 1.5(x)$

ANSWER:

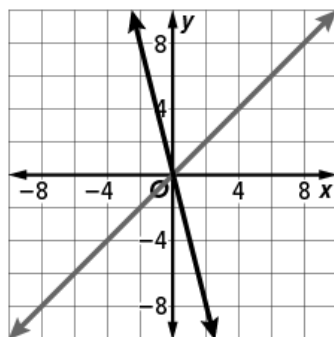$g(x)$ is a vertical stretch of the parent function by a factor of 1.5

13. $g(x) = (3x)$

ANSWER:

$g(x)$ is a horizontal compression of the parent function by a factor of $\frac{1}{3}$

14. $g(x) = \left(\frac{3}{4}x\right)$

15. $g(x) = (0.4x)$

ANSWER:

$g(x)$ is a horizontal stretch of the parent function by a factor of $\frac{4}{3}$
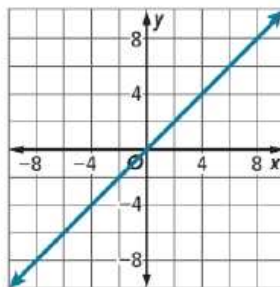
ANSWER:

$g(x)$ is a horizontal stretch of the parent function by a factor of 2.5
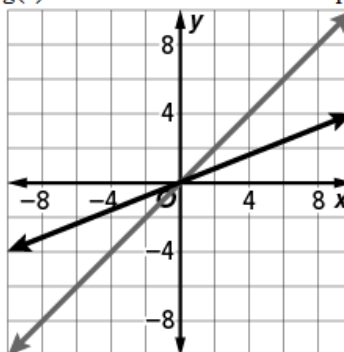
Describe the dilation in each function as it relates to the graph of the parent function.

16. $g(x) = -4(x)$
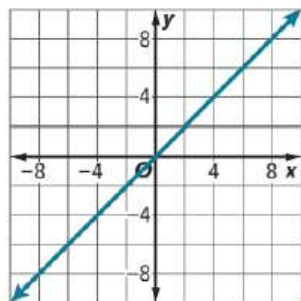
17. $g(x) = -8(x)$

18. $g(x) = -\frac{2}{3}(x)$

ANSWER:

$g(x)$ is a vertical stretch of the parent function by a factor of 4 and a reflection across the x-axis
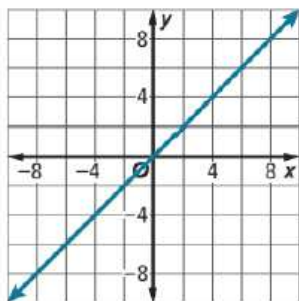
ANSWER:

$g(x)$ is a vertical stretch of the parent function by a factor of 8 and a reflection across the x-axis
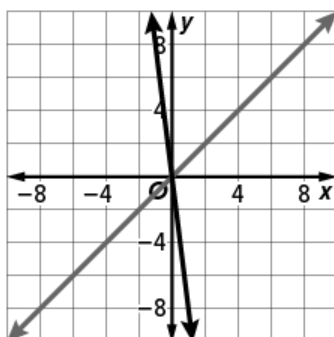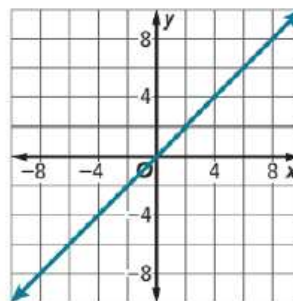
ANSWER:

$g(x)$ is a vertical compression of the parent function by a factor of $\frac{2}{3}$ and a reflection across the x-axis
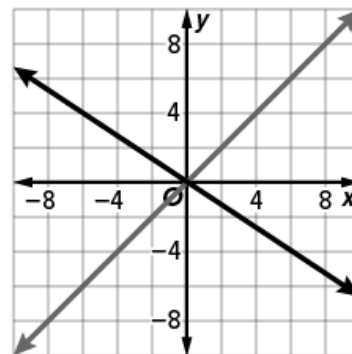
Use the given arithmetic sequence to write an equation and then find the 7th term of the sequence.

19. $-3, -8, -13, -18, ...$

SOLUTION:

The common difference is -5, so $d = -5$. The first term is -3, so $a_1 = -3$.

$$a_n = a_1 + (n-1)d \qquad \text{nth term of an arithmetic sequence}$$
$$a_n = -3 + (n-1)(-5) \qquad \text{Substitute } -3 \text{ for } a_1 \text{ and } -5 \text{ for } d.$$
$$a_n = -3 - 5n + 5 \qquad \text{Distributive Property}$$
$$a_n = -5n + 2 \qquad \text{Simplify.}$$

The equation is $a_n = -5n + 2$.

$$a_n = -5n + 2 \qquad \text{Equation}$$
$$a_7 = -5(7) + 2 \qquad \text{Substitute 7 for } n.$$
$$a_7 = -35 + 2 \qquad \text{Multiply.}$$
$$a_7 = -33 \qquad \text{Simplify.}$$

The 7th term is -33.

20. $-2, 3, 8, 13, ...$

SOLUTION:

The common difference is 5, so $d = 5$. The first term is -2, so $a_1 = -2$.

$$a_n = a_1 + (n-1)d \qquad \text{nth term of an arithmetic sequence}$$
$$a_n = -2 + (n-1)(5) \qquad \text{Substitute } -2 \text{ for } a_1 \text{ and } 5 \text{ for } d.$$
$$a_n = -2 + 5n - 5 \qquad \text{Distributive Property}$$
$$a_n = 5n - 7 \qquad \text{Simplify.}$$

The equation is $a_n = 5n - 7$.

$$a_n = 5n - 7 \qquad \text{Equation}$$
$$a_7 = 5(7) - 7 \qquad \text{Substitute 7 for } n.$$
$$a_7 = 35 - 7 \qquad \text{Multiply.}$$
$$a_7 = 28 \qquad \text{Simplify.}$$

The 7th term is 28.

21. $-11, -15, -19, -23, ...$

SOLUTION:

The common difference is -4, so $d = -4$. The first term is -11, so $a_1 = -11$.

$$a_n = a_1 + (n-1)d \qquad \text{nth term of an arithmetic sequence}$$
$$a_n = -11 + (n-1)(-4) \qquad \text{Substitute } -11 \text{ for } a_1 \text{ and } -4 \text{ for } d.$$
$$a_n = -11 - 4n + 4 \qquad \text{Distributive Property}$$
$$a_n = -4n - 7 \qquad \text{Simplify.}$$

The equation is $a_n = -4n - 7$.

$$a_n = -4n - 7 \qquad \text{Equation}$$
$$a_7 = -4(7) - 7 \qquad \text{Substitute 7 for } n.$$
$$a_7 = -28 - 7 \qquad \text{Multiply.}$$
$$a_7 = -35 \qquad \text{Simplify.}$$

The 7th term is -35.

22. $-0.75, -0.5, -0.25, 0, ...$

SOLUTION:

The common difference is 0.25, so $d = 0.25$. The first term is -0.75, so $a_1 = -0.75$.

$$a_n = a_1 + (n-1)d \qquad \text{nth term of an arithmetic sequence}$$
$$a_n = -0.75 + (n-1)(0.25) \qquad \text{Substitute } -0.75 \text{ for } a_1 \text{ and } 0.25 \text{ for } d.$$
$$a_n = -0.75 + 0.25n - 0.25 \qquad \text{Distributive Property}$$
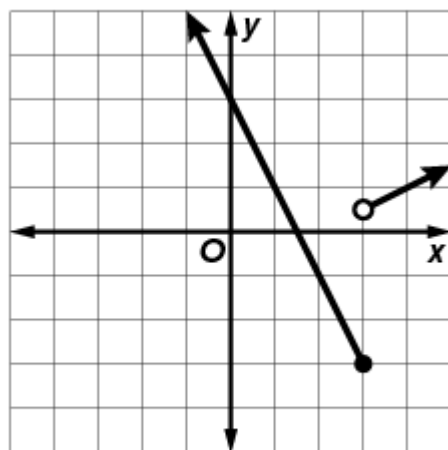$$a_n = 0.25n - 1 \qquad \text{Simplify.}$$

The equation is $a_n = 0.25n - 1$.

$$a_n = 0.25n - 1 \qquad \text{Equation}$$
$$a_7 = 0.25(7) - 1 \qquad \text{Substitute 7 for } n.$$
$$a_7 = 1.75 - 1 \qquad \text{Multiply.}$$
$$a_7 = 0.75 \qquad \text{Simplify.}$$

The 7th term is 0.75.

Graph each function. State the domain and range.

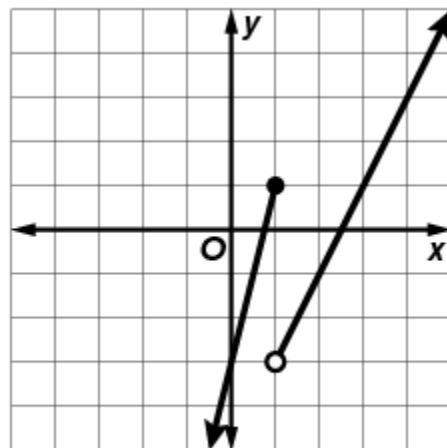**1.** $f(x) = \begin{cases} \frac{1}{2}x - 1 & \text{if } x > 3 \\ -2x + 3 & \text{if } x \leq 3 \end{cases}$

2. $f(x) = \begin{cases} 2x - 5 & \text{if } x > 1 \\ 4x - 3 & \text{if } x \leq 1 \end{cases}$
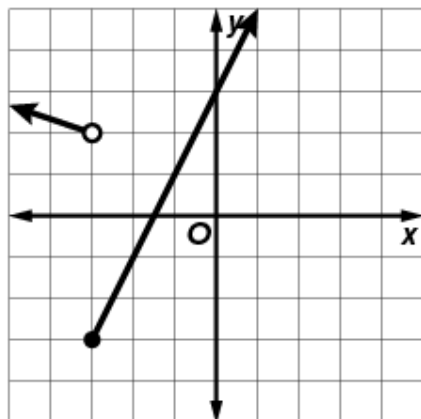
ANSWER:

D = all real numbers, R = $f(x) \geq -3$

ANSWER:

D = all real numbers, R = all real numbers

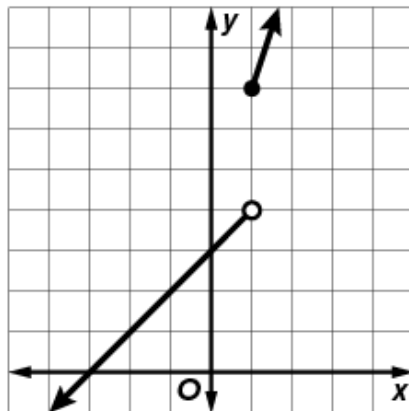**3.** $f(x) = \begin{cases} 2x + 3 & \text{if } x \geq -3 \\ -\frac{1}{3}x + 1 & \text{if } x < -3 \end{cases}$

4. $f(x) = \begin{cases} 3x + 4 & \text{if } x \geq 1 \\ x + 3 & \text{if } x < 1 \end{cases}$

ANSWER:

D = all real numbers, R = $f(x) \geq -3$

ANSWER:

D = all real numbers, R = $f(x) < 4$ or $f(x) \geq 7$

5. $f(x) = \begin{cases} 3x + 2 & \text{if } x > -1 \\ -\frac{1}{2}x - 3 & \text{if } x \leq -1 \end{cases}$
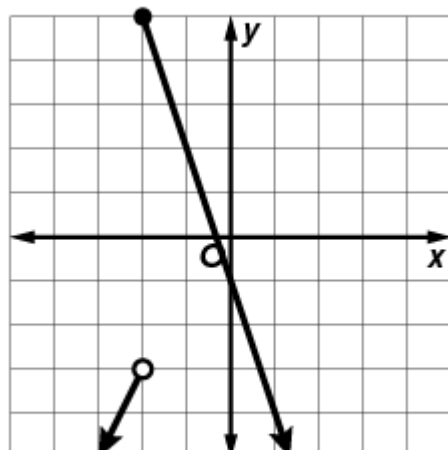
6. $f(x) = \begin{cases} 2x + 1 & \text{if } x < -2 \\ -3x - 1 & \text{if } x \geq -2 \end{cases}$

ANSWER:
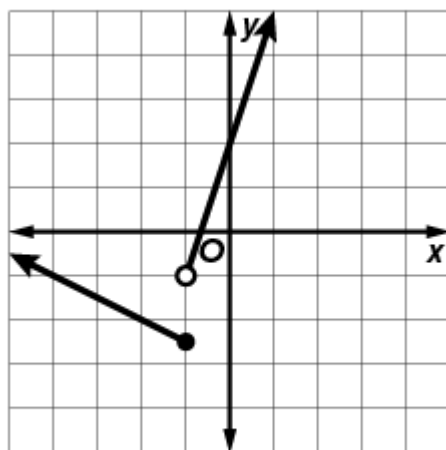
D = all real numbers, $R = f(x) \geq -2.5$

ANSWER:

D = all real numbers, $R = f(x) \leq 5$

10	Apply translations to absolute value functions.	(1-9)	277

Describe the translation in g(x) as it relates to the graph of the parent function.

1. $g(x) = |x| - 5$

ANSWER:
The graph of $g(x)$ is the parent function translated 5 units down.

2. $g(x) = |x + 6|$

ANSWER:
The graph of $g(x)$ is the parent function translated 6 units left.

3. $g(x) = |x - 2| + 7$

ANSWER:
The graph of $g(x)$ is the parent function translated 2 units right and 7 units up.

4. $g(x) = |x + 1| - 3$

ANSWER:
The graph of $g(x)$ is the parent function translated 1 unit left and 3 units down.

5. $g(x) = |x| + 1$

ANSWER:
The graph of $g(x)$ is the parent function translated 1 unit up.
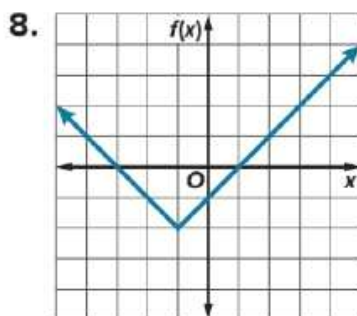
6. $g(x) = |x - 8|$

ANSWER:
The graph of $g(x)$ is the parent function translated 8 units right.

Use the graph of the function to write its equation.

7.

ANSWER:
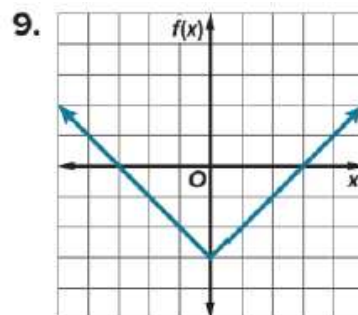$f(x) = |x + 2|$

8.

ANSWER:
$f(x) = |x + 1| - 2$

9.
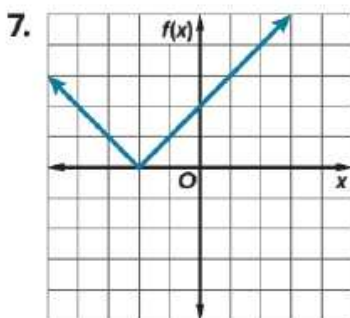
ANSWER:
$f(x) = |x| - 3$

11	Write an equation of a line in slope-intercept form given the slope and one point	(1-6)	291

Write an equation of the line that passes through the given point and has the given slope.

1. (4, 2); slope $\frac{1}{2}$

SOLUTION:

Step 1 Find the y-intercept.
$y = mx + b$ Slope – intercept form

$2 = \frac{1}{2}(4) + b$ $m = \frac{1}{2}$, $x = 4$, and $y = 2$

$2 = 2 + b$ Simplify.

$0 = b$ Subtract 2 from each side.

Step 2 Write the equation in slope-intercept form.
$y = mx + b$ Slope – intercept form

$y = \frac{1}{2}x + 0$ $m = \frac{1}{2}$ and $b = 0$

$y = \frac{1}{2}x$ Simplify.

2. (3, −2); slope $\frac{1}{3}$

SOLUTION:

Step 1 Find the y-intercept.
$y = mx + b$ Slope – intercept form

$-2 = \frac{1}{3}(3) + b$ $m = \frac{1}{3}$, $x = 3$, and $y = -2$

$-2 = 1 + b$ Simplify.

$-3 = b$ Subtract 1 from each side.

Step 2 Write the equation in slope-intercept form.
$y = mx + b$ Slope – intercept form

$y = \frac{1}{3}x - 3$ $m = \frac{1}{3}$ and $b = -3$

3. (6, 4); slope $-\frac{3}{4}$

SOLUTION:

Step 1 Find the y-intercept.
$y = mx + b$ Slope – intercept form

$4 = -\frac{3}{4}(6) + b$ $m = -\frac{3}{4}$, $x = 6$, and $y = 4$

$4 = -\frac{9}{2} + b$ Simplify.

$\frac{17}{2} = b$ Add $\frac{9}{2}$ to each side.

Step 2 Write the equation in slope-intercept form.
$y = mx + b$ Slope – intercept form

$y = -\frac{3}{4}x + \frac{17}{2}$ $m = -\frac{3}{4}$ and $b = \frac{17}{2}$

4. (−5, 4); slope −3

SOLUTION:

Step 1 Find the y-intercept.
$y = mx + b$ Slope – intercept form

$4 = -3(-5) + b$ $m = -3$, $x = -5$, and $y = 4$

$4 = 15 + b$ Simplify.

$-11 = b$ Subtract 15 from each side.

Step 2 Write the equation in slope-intercept form.
$y = mx + b$ Slope – intercept form

$y = -3x - 11$ $m = -3$ and $b = -11$

5. (4, 3); slope $\frac{1}{2}$

SOLUTION:

Step 1 Find the y-intercept.
$y = mx + b$ Slope – intercept form

$3 = \frac{1}{2}(4) + b$ $m = \frac{1}{2}$, $x = 4$, and $y = 3$

$3 = 2 + b$ Simplify.

$1 = b$ Subtract 2 from each side.

Step 2 Write the equation in slope-intercept form.
$y = mx + b$ Slope – intercept form

$y = \frac{1}{2}x + 1$ $m = \frac{1}{2}$ and $b = 1$

6. (1, −5); slope $-\frac{3}{2}$

SOLUTION:

Step 1 Find the y-intercept.
$y = mx + b$ Slope – intercept form

$-5 = -\frac{3}{2}(1) + b$ $m = -\frac{3}{2}$, $x = 1$, and $y = -5$

$-5 = -\frac{3}{2} + b$ Simplify.

$-\frac{7}{2} = b$ Add $\frac{3}{2}$ to each side.

Step 2 Write the equation in slope-intercept form.
$y = mx + b$ Slope – intercept form

$y = -\frac{3}{2}x - \frac{7}{2}$ $m = -\frac{3}{2}$ and $b = -\frac{7}{2}$

Find the inverse of each function.

16. $f(x) = 8x - 5$

SOLUTION:

$f(x) = 8x - 5$ Original equation

$y = 8x - 5$ Replace $f(x)$ with y.

$x = 8y - 5$ Interchange y and x.

$x + 5 = 8y$ Add 5 to each side.

$\dfrac{x+5}{8} = y$ Divide each side by 8.

$\dfrac{x+5}{8} = f^{-1}(x)$ Replace y with $f^{-1}(x)$.

The inverse of $f(x) = 8x - 5$ is $f^{-1}(x) = \dfrac{x+5}{8}$ or $f^{-1}(x) = \dfrac{1}{8}x + \dfrac{5}{8}$

17. $f(x) = 6(x + 7)$

SOLUTION:

$f(x) = 6(x + 7)$ Original equation

$y = 6(x + 7)$ Replace $f(x)$ with y.

$x = 6(y + 7)$ Interchange y and x.

$x = 6y + 42$ Simplify.

$x - 42 = 6y$ Subtract 42 from each side.

$\dfrac{x-42}{6} = y$ Divide each side by 6.

$\dfrac{x-42}{6} = f^{-1}(x)$ Replace y with $f^{-1}(x)$.

The inverse of $f(x) = 6(x + 7)$ is $f^{-1}(x) = \dfrac{x-42}{6}$ or $f^{-1}(x) = \dfrac{x}{6}x - 7$.

18. $f(x) = \frac{3}{4}x + 9$

SOLUTION:

$f(x) = \dfrac{3}{4}x + 9$ Original equation

$y = \dfrac{3}{4}x + 9$ Replace $f(x)$ with y.

$x = \dfrac{3}{4}y + 9$ Interchange y and x.

$x - 9 = \dfrac{3}{4}y$ Subtract 9 from each side.

$\dfrac{4}{3}(x - 9) = y$ Mulitply each side by $\dfrac{4}{3}$.

$\dfrac{4}{3}(x - 9) = f^{-1}(x)$ Replace y with $f^{-1}(x)$.

The inverse of $f(x) = \dfrac{3}{4}x + 9$ is $f^{-1}(x) = \dfrac{4}{3}(x - 9)$.

19. $f(x) = -16 + \frac{2}{5}x$

SOLUTION:

$f(x) = -16 + \dfrac{2}{5}x$ Original equation

$y = -16 + \dfrac{2}{5}x$ Replace $f(x)$ with y.

$x = -16 + \dfrac{2}{5}y$ Interchange y and x.

$x + 16 = \dfrac{2}{5}y$ Add 16 to each side.

$\dfrac{5}{2}(x + 16) = y$ Mulitply each side by $\dfrac{5}{2}$.

$\dfrac{5}{2}(x + 16) = f^{-1}(x)$ Replace y with $f^{-1}(x)$.

The inverse of $f(x) = -16 + \dfrac{2}{5}x$ is $f^{-1}(x) = \dfrac{5}{2}(x + 16)$.

20. $f(x) = \dfrac{3x + 5}{4}$

SOLUTION:

$f(x) = \dfrac{3x+5}{4}$ Original equation

$y = \dfrac{3x+5}{4}$ Replace $f(x)$ with y.

$x = \dfrac{3y+5}{4}$ Interchange y and x.

$4x = 3y + 5$ Multiply each side by 4.

$4x - 5 = 3y$ Subtract 5 from each side.

$\dfrac{4x-5}{3} = y$ Divide each side by 3.

$\dfrac{4x-5}{3} = f^{-1}(x)$ Replace y with $f^{-1}(x)$.

The inverse of $f(x) = \dfrac{3x+5}{4}$ is $f^{-1}(x) = \dfrac{4x-5}{3}$.

21. $f(x) = \dfrac{-4x + 1}{5}$

SOLUTION:

$f(x) = \dfrac{-4x+1}{5}$ Original equation

$y = \dfrac{-4x+1}{5}$ Replace $f(x)$ with y.

$x = \dfrac{-4y+1}{5}$ Interchange y and x.

$5x = -4y + 1$ Multiply each side by 5.

$5x - 1 = -4y$ Subtract 1 from each side.

$\dfrac{5x-1}{-4} = y$ Divide each side by -4.

$\dfrac{1-5x}{4} = f^{-1}(x)$ Replace y with $f^{-1}(x)$.

The inverse of $f(x) = \dfrac{-4x+1}{5}$ is $f^{-1}(x) = \dfrac{1-5x}{4}$.

13	Solve linear inequalities by using subtraction	(21-30)	347

Solve each inequality.

21. $11 + m \geq 15$

22. $h - 26 < 4$

23. $8 \leq r - 14$

v

SOLUTION:

$11 + m \geq 15$ Original inequality

$11 - 11 + m \geq 15 - 11$ Subtract 11 from each side.

$m \geq 4$ Simplify.

The solution set is $\{m \mid m \geq 4\}$.

SOLUTION:

$h - 26 < 4$ Original inequality

$h - 26 + 26 < 4 + 26$ Add 26 to each side.

$h < 30$ Simplify.

The solution set is $\{h \mid h < 30\}$.

SOLUTION:

$8 \leq r - 14$ Original inequality

$8 + 14 \leq r - 14 + 14$ Add 14 to each side.

$22 \leq r$ Simplify.

The solution set is $\{r \mid r \geq 22\}$.

24. $-7 > 20 + c$

25. $2a \leq -4 + a$

26. $z + 4 \geq 2z$

SOLUTION:

$-7 > 20 + c$ Original inequality

$-7 - 29 < 20 - 20 + c$ Subtract 20 from each side.

$-27 > c$ Simplify.

The solution set is $\{c \mid c < -27\}$.

SOLUTION:

$2a \leq -4 + a$ Original inequality

$2a - a \leq -4 + a - a$ Subtract a from each side.

$a \leq -4$ Simplify.

The solution set is $\{a \mid a \leq -4\}$.

SOLUTION:

$z + 4 \geq 2z$ Original inequality

$z - z + 4 \geq 2z - z$ Subtract z from each side.

$4 \geq z$ Simplify.

The solution set is $\{z \mid z \leq 4\}$.

27. $w - 5 \leq 2w$

SOLUTION:

$$w - 5 \leq 2w \qquad \text{Original inequality}$$
$$w - w - 5 \leq 2w - w \qquad \text{Subtract } w \text{ from each side.}$$
$$-5 \leq w \qquad \text{Simplify.}$$

The solution set is $\{w \mid w \geq -5\}$.

28. $3y \leq 2y - 6$

SOLUTION:

$$3y \leq 2y - 6 \qquad \text{Original inequality}$$
$$3y - 2y \leq 2y - 2y - 6 \qquad \text{Subtract } 2y \text{ from each side.}$$
$$y \leq -6 \qquad \text{Simplify.}$$

The solution set is $\{y \mid y \leq -6\}$.

29. $6x + 5 \geq 7x$

SOLUTION:

$$6x + 5 \geq 7x \qquad \text{Original inequality}$$
$$6x - 6x + 5 \geq 7x - 6x \qquad \text{Subtract } 6x \text{ from each side.}$$
$$5 \geq x \qquad \text{Simplify.}$$

The solution set is $\{x \mid x \leq 5\}$.

30. $-9 + 2a < 3a$

SOLUTION:

$$-9 + 2a < 3a \qquad \text{Original inequality}$$
$$-9 + 2a - 2a < 3a - 2a \qquad \text{Subtract } 2a \text{ from each side.}$$
$$-9 < a \qquad \text{Simplify.}$$

The solution set is $\{a \mid a > -9\}$.

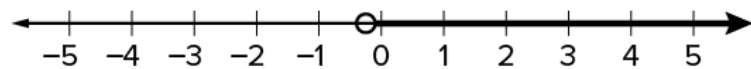| 14	Solve multi-step linear inequalities.	(16-27)	354

Solve each inequality. Then graph the solution on a number line.

16. $-3(7n + 3) < 6n$

SOLUTION:

$$-3(7n + 3) < 6n \qquad \text{Original inequality}$$
$$-21n - 9 < 6n \qquad \text{Distributive Property}$$
$$-9 < 27n \qquad \text{Add } 21n \text{ to each side.}$$
$$-\frac{1}{3} < n \qquad \text{Divide each side by 27.}$$

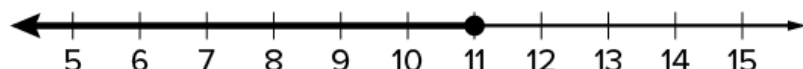Graph the inequality $n > -\frac{1}{3}$ on a number line.

17. $21 \geq 3(a - 7) + 9$

SOLUTION:

$$21 \geq 3(a - 7) + 9 \qquad \text{Original inequality}$$
$$21 \geq 3a - 21 + 9 \qquad \text{Distributive Property}$$
$$21 \geq 3a - 12 \qquad \text{Simplify.}$$
$$33 \geq 3a \qquad \text{Add 12 to each side.}$$
$$11 \geq a \qquad \text{Divide each side by 3.}$$
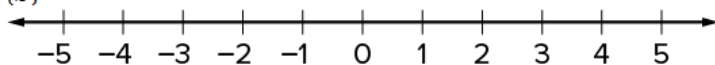
Graph the inequality $a \leq 11$ on a number line.

18. $2y + 4 > 2(3 + y)$

SOLUTION:

$$2y + 4 > 2(3 + y) \qquad \text{Original inequality}$$
$$2y + 4 > 6 + 2y \qquad \text{Distributive Property}$$
$$2y > 2 + 2y \qquad \text{Subtract 4 from each side.}$$
$$0 > 2 \qquad \text{Subtract } 2y \text{ from each side.}$$

$\{\emptyset\}$

19. $3(2 - b) < 10 - 3(b - 6)$

SOLUTION:

$$3(2 - b) < 10 - 3(b - 6) \qquad \text{Original inequality}$$
$$6 - 3b < 10 - 3b + 18 \qquad \text{Distributive Property}$$
$$6 - 3b < 28 - 3b \qquad \text{Simplify.}$$
$$-3b < 22 - 3b \qquad \text{Subtract 6 from each side.}$$
$$0 < 22 \qquad \text{Add } 3b \text{ to each side.}$$

$\{b \mid b \text{ is a real number.}\}$
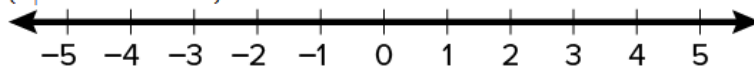
20. $7 + t \leq 2(t + 3) + 2$

SOLUTION:

$7 + t \leq 2(t+3) + 2$	Original inequality
$7 + t \leq 2t + 6 + 2$	Distributive Property
$7 + t \leq 2t + 8$	Simplify.
$-1 + t \leq 2t$	Subtract 8 from each side.
$-1 \leq t$	Subtract t from each side.

Graph the inequality $t \geq -1$ on a number line.

21. $8a + 2(1 - 5a) \leq 20$

SOLUTION:

$8a + 2(1 - 5a) \leq 20$	Original inequality
$8a + 2 - 10a \leq 20$	Distributive Property
$-2a + 2 \leq 20$	Simplify.
$-2a \leq 18$	Subtract 2 from each side.
$a \geq -9$	Divide each side by -2.

Graph the inequality $a \geq -9$ on a number line.
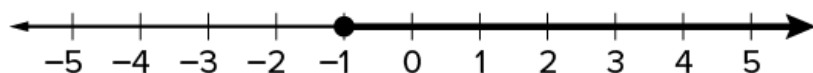
Solve each inequality.

22. $2(x - 4) \leq 2 + 3(x - 6)$

SOLUTION:

$2(x-4) \leq 2 + 3(x-6)$	Original inequality
$2x - 8 \leq 2 + 3x - 18$	Distributive Property
$2x - 8 \leq 3x - 16$	Simplify.
$2x + 8 \leq 3x$	Add 16 to each side.
$8 \leq x$	Subtract $2x$ from each side.
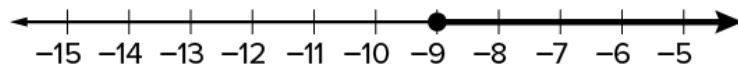
ANSWER:
$\{x \mid x \geq 8\}$

23. $\dfrac{2x - 4}{6} \geq -5x + 2$

SOLUTION:

$\dfrac{2x-4}{6} \geq -5x + 2$	Original inequality
$2x - 4 \geq -30x + 12$	Multiply each side by 6.
$2x \geq -30x + 16$	Add 4 to each side.
$32x \geq 16$	Add $30x$ to each side.
$x \geq \dfrac{1}{2}$	Divide each side by 32.

ANSWER:
$\left\{x \mid x \geq \dfrac{1}{2}\right\}$

24. $5.6z + 1.5 < 2.5z - 4.7$

SOLUTION:

$5.6z + 1.5 < 2.5z - 4.7$	Original inequality
$5.6z < 2.5z - 6.2$	Subtract 1.5 from each side.
$3.1z < -6.2$	Subtract $2.5z$ from each side.
$z < -2$	Divide each side by 3.1.

ANSWER:
$\{z \mid z < -2\}$

25. $0.7(2m - 5) \geq 21.7$

SOLUTION:

$0.7(2m - 5) \geq 21.7$	Original inequality
$1.4m - 3.5 \geq 21.7$	Distributive Property
$1.4m \geq 25.2$	Add 3.5 to each side.
$m \geq 18$	Divide each side by 1.4.

ANSWER:
$\{m \mid m \geq 18\}$

26. $2(-3m - 5) \geq -28$

SOLUTION:

$2(-3m - 5) \geq -28$	Original inequality
$-6m - 10 \geq -28$	Distributive Property
$-6m \geq -18$	Add 10 to each side.
$m \leq 3$	Divide each side by -6.

ANSWER:
$\{m \mid m \leq 3\}$

27. $-6(w + 1) < 2(w + 5)$

SOLUTION:

$-6(w + 1) < 2(w + 5)$	Original inequality
$-6w - 6 < 2w + 10$	Distributive Property
$-6w - 16 < 2w$	Subtract 10 from each side.
$-16 < 8w$	Add $6w$ to each side.
$-2 < w$	Divide each side by 8.

ANSWER:
$\{w \mid w > -2\}$

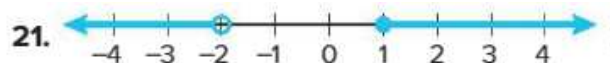**Write a compound inequality that describes each graph.**
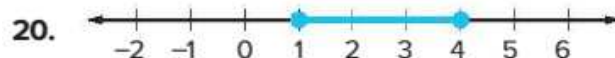
19.

ANSWER:
$-3 < x \leq 3$

20.

ANSWER:
$1 \leq x \leq 4$

21.

ANSWER:
$x < -2$ or $x \geq 1$

22.

ANSWER:
$x < -1$ or $x > 2$

23.

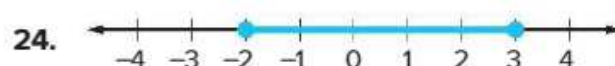
ANSWER:
$b > 3$ or $b \leq 0$
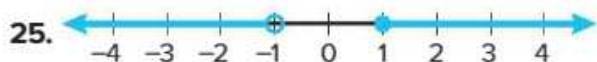
24.

ANSWER:
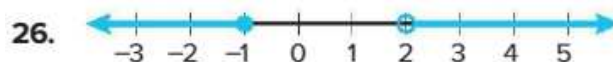$-2 \leq z \leq 3$

25.

ANSWER:
$y < -1$ or $y \geq 1$

26.
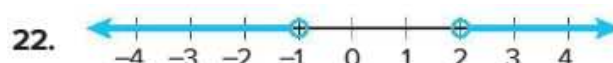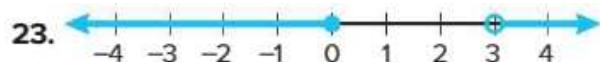
ANSWER:
$x \leq -1$ or $x > 2$

Part 2: Free Response Questions (FRQ): Questions 16-21

16	Prove that equations are identities or have no solution.	(25-36)	98

Solve each equation and state whether the equation has *one solution, no solution,* or is an *identity.*

25. $-6y - 3 = 3 - 6y$

SOLUTION:

$$\begin{array}{ll} -6y - 3 = 3 - 6y & \text{Original equation} \\ -6y + 6y - 3 = 3 - 6y + 6y & \text{Add } 6y \text{ to each side.} \\ -3 \neq 3 & \text{Simplify.} \end{array}$$

Since $-3 \neq 3$, this equation has no solution.

26. $\frac{1}{2}(x + 6) = \frac{1}{2}x - 9$

SOLUTION:

$$\begin{array}{ll} \frac{1}{2}(x+6) = \frac{1}{2}x - 9 & \text{Original equation} \\ \frac{1}{2}x + 3 = \frac{1}{2}x - 9 & \text{Distributive Property} \\ \frac{1}{2}x - \frac{1}{2}x + 3 = \frac{1}{2}x - \frac{1}{2}x - 9 & \text{Subtract } \frac{1}{2}x \text{ from each side.} \\ 3 \neq -9 & \text{Simplify.} \end{array}$$

Since $3 \neq -9$, this equation has no solution.

27. $8q + 12 = 4(3 + 2q)$

SOLUTION:

$$\begin{array}{ll} 8q + 12 = 4(3 + 2q) & \text{Original equation} \\ 8q + 12 = 12 + 8q & \text{Distributive Property} \\ 0 = 0 & \text{Subtract } 8q + 12 \text{ from each side.} \end{array}$$

Since $0 = 0$, this equation is an identity.

28. $21(x + 1) - 6x = 15x + 21$

SOLUTION:

$$\begin{array}{ll} 21(x+1) - 6x = 15x + 21 & \text{Original equation} \\ 21x + 21 - 6x = 15x + 21 & \text{Distributive Property} \\ 15x + 21 = 15x + 21 & \text{Simplify.} \\ 0 = 0 & \text{Subtract } 15x + 21 \text{ from each side.} \end{array}$$

Since $0 = 0$, this equation is an identity.

29. $12y + 48 - 4y = 8(y - 6)$

SOLUTION:

$$\begin{array}{ll} 12y + 48 - 4y = 8(y - 6) & \text{Original equation} \\ 12y + 48 - 4y = 8y - 48 & \text{Distributive Property} \\ 8y + 48 = 8y - 48 & \text{Simplify.} \\ 8y - 8y + 48 = 8y - 8y - 48 & \text{Subtract } 8y \text{ from each side.} \\ 48 \neq -48 & \text{Simplify.} \end{array}$$

Since $48 \neq -48$, this equation has no solution.

30. $8(z + 6) = 4(2z + 12)$

SOLUTION:

$$\begin{array}{ll} 8(z+6) = 4(2z + 12) & \text{Original equation} \\ 8z + 48 = 8z + 48 & \text{Distributive Property} \\ 0 = 0 & \text{Subtract } 8z + 48 \text{ from each side.} \end{array}$$

Since $0 = 0$, this equation is an identity.

31. $2a + 2 = 3(a + 2)$

SOLUTION:

$$
\begin{array}{ll}
2a + 2 = 3(a + 2) & \text{Original equation} \\
2a + 2 = 3a + 6 & \text{Distributive Property} \\
2a - 2a + 2 = 3a - 2a + 6 & \text{Subtract } 2a \text{ from each side.} \\
2 = a + 6 & \text{Simplify.} \\
2 - 6 = a + 6 - 6 & \text{Subtract 6 from each side.} \\
-4 = a & \text{Simplify.}
\end{array}
$$

Since $a = -4$, this equation has one solution.

32. $\frac{1}{4}x + 5 = \frac{1}{4}x$

SOLUTION:

$$
\begin{array}{ll}
\frac{1}{4}x + 5 = \frac{1}{4}x & \text{Original equation} \\
\frac{1}{4}x - \frac{1}{4}x + 5 = \frac{1}{4}x - \frac{1}{4}x & \text{Subtract } \frac{1}{4}x \text{ from each side.} \\
5 \neq 0 & \text{Simplify.}
\end{array}
$$

Since $5 \neq 0$, this equation has no solution.

33. $7(c + 9) = 7c + 63$

SOLUTION:

$$
\begin{array}{ll}
7(c + 9) = 7c + 63 & \text{Original equation} \\
7c + 63 = 7c + 63 & \text{Distributive Property} \\
0 = 0 & \text{Subtract } 7c + 63 \text{ from each side.}
\end{array}
$$

Since $0 = 0$, this equation is an identity.

34. $4k + 3 = \frac{1}{4}(8k + 16)$

SOLUTION:

$$
\begin{array}{ll}
4k + 3 = \frac{1}{4}(8k + 16) & \text{Original equation} \\
4k + 3 = 2k + 4 & \text{Distributive Property} \\
4k - 2k + 3 = 2k - 2k + 4 & \text{Subtract } 2k \text{ from each side.} \\
2k + 3 = 4 & \text{Simplify.} \\
2k + 3 - 3 = 4 - 3 & \text{Subtract 3 from each side.} \\
2k = 1 & \text{Simplify.} \\
\frac{2k}{2} = \frac{1}{2} & \text{Divide each side by 2.} \\
k = \frac{1}{2} & \text{Simplify.}
\end{array}
$$

Since $k = \frac{1}{2}$, this equation has one solution.

35. $3b - 13 + 4b = 7b + 1$

SOLUTION:

$$
\begin{array}{ll}
3b - 13 + 4b = 7b + 1 & \text{Original equation} \\
7b - 13 = 7b + 1 & \text{Simplify.} \\
7b - 7b - 13 = 7b - 7b + 1 & \text{Subtract } 7b \text{ from each side.} \\
-13 \neq 1 & \text{Simplify.}
\end{array}
$$

Since $-13 \neq 1$, this equation has no solution.

36. $\frac{1}{2}(\frac{1}{2}m - 8) = \frac{1}{4}(m - 16)$

SOLUTION:

$$
\begin{array}{ll}
\frac{1}{2}\left(\frac{1}{2}m - 8\right) = \frac{1}{4}(m - 16) & \text{Original equation} \\
\frac{1}{4}m - 4 = \frac{1}{4}m - 4 & \text{Distributive Property} \\
0 = 0 & \text{Subtract } \frac{1}{4}m - 4 \text{ from each side.}
\end{array}
$$

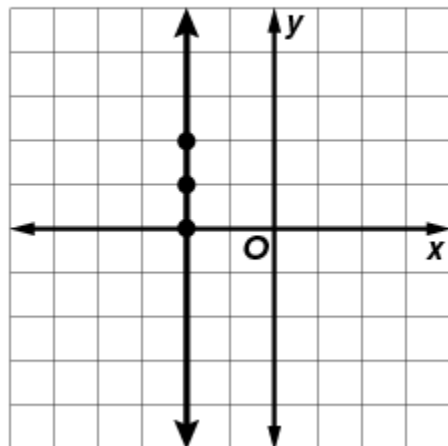Since $0 = 0$, this equation is an identity.

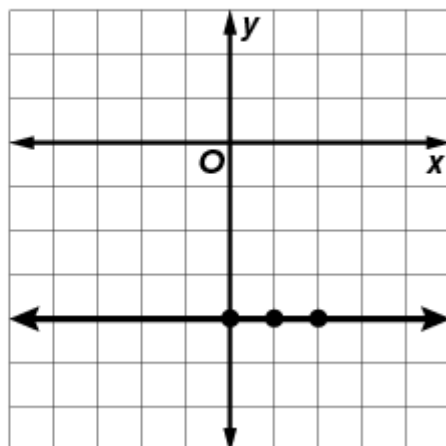## Graph each equation by making a table.

1. $x = -2$

ANSWER:

x	y
-2	0
-2	1
-2	2

2. $y = -4$

ANSWER:

x	y
0	-4
1	-4
2	-4

3. $y = -8x$

ANSWER:

x	y
-1	8
0	0
1	-8

4. $3x = y$
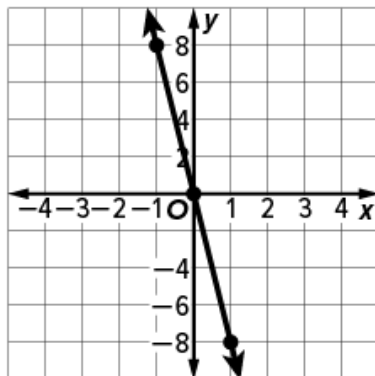
ANSWER:

x	y
0	0
1	3
2	6
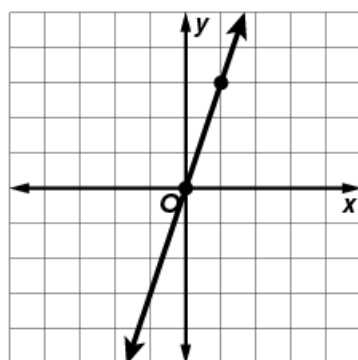
5. $y - 8 = -x$

ANSWER:

x	y
0	8
1	7
2	6
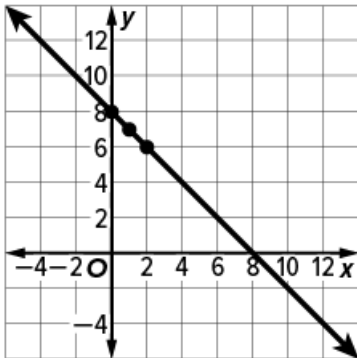
6. $x = 10 - y$

ANSWER:

x	y
0	10
1	9
2	8
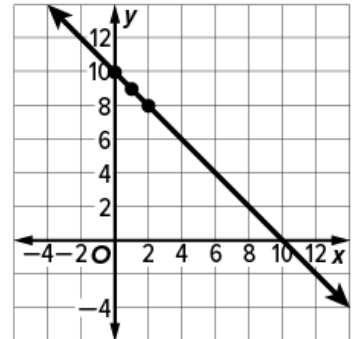
7. $y = \frac{1}{2}x + 1$

ANSWER:

x	y
0	1
2	2
4	3
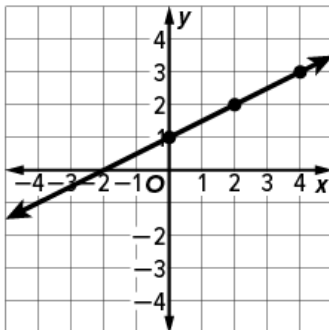
8. $y + 2 = \frac{1}{4}x$

ANSWER:

x	y
0	-2
4	-1
8	0
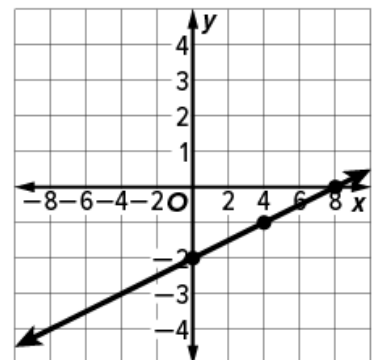
Example 3 Constant Rate of Change

Determine whether the function is linear. If it is, state the rate of change.

Find the changes in the x-values and the changes in the y-values.

Notice that the rate of change for each pair of points shown is $-\frac{2}{3}$.

The rates of change are constant, so the function is linear. The rate of change is $-\frac{2}{3}$.

x	y
11	−5
8	−3
5	−1
2	1
−1	3

Example 4 Rate of Change

Determine whether the function is linear. If it is, state the rate of change.

Find the changes in the x-values and the changes in the y-values.

The rates of change are not constant. Between some pairs of points the rate of change is $\frac{3}{7}$, and between the other pairs it is $\frac{2}{7}$. Therefore, this is not a linear function.

x	y
22	−4
29	−1
36	1
43	4
50	6

Determine whether the function is linear. If it is, state the rate of change.

7.

x	4	2	0	−2	−4
y	−1	1	3	5	7

SOLUTION:

Find the changes in the x-values and the changes in the y-values.

The rates of change are constant. Between the pairs of points the rate of change is −1. Therefore, this is a linear function.

ANSWER:

linear; $-\frac{1}{1}$ or −1

8.

x	−7	−5	−3	−1	0
y	11	14	17	20	23

SOLUTION:

Find the changes in the x-values and the changes in the y-values.

The rates of change are not constant. Between some pairs of points the rate of change is 1.5, and between other pairs it is 3. Therefore, this is not a linear function.

ANSWER:
not linear

9.

x	−0.2	0	0.2	0.4	0.6
y	0.7	0.4	0.1	0.3	0.6

SOLUTION:

Find the changes in the x-values and the changes in the y-values.

The rates of change are not constant. Between some pairs of points the rate of change is −1.5, between other pairs it is 1, and between other pairs it is 1.5. Therefore, this is not a linear function.

ANSWER:
not linear

10.

x	$\frac{1}{2}$	$\frac{3}{2}$	$\frac{5}{2}$	$\frac{7}{2}$	$\frac{9}{2}$
y	$\frac{1}{2}$	1	$\frac{3}{2}$	2	$\frac{5}{2}$

SOLUTION:

Find the changes in the x-values and the changes in the y-values.

Notice that the rate of change for each pair of points shown is $\frac{1}{2}$.

The rates of change are constant, so the function is linear. The rate of change is $\frac{1}{2}$.

ANSWER:
linear; $\frac{1}{2}$

Solve each equation or formula for the variable indicated.

7. $q - r = r$, for r

SOLUTION:

$q - r = r$	Original equation
$q - r + r = r + r$	Add r to each side.
$q = 2r$	Simplify.
$\dfrac{q}{2} = \dfrac{2r}{2}$	Divide each side by 2.
$\dfrac{q}{2} = r$	Simplify.

8. $4m - t = m$, for m

SOLUTION:

$4m - t = m$	Original equation
$4m - t + t = m + t$	Add t to each side.
$4m = m + t$	Simplify.
$4m - m = m - m + t$	Subtract m from each side.
$3m = t$	Simplify.
$\dfrac{3m}{3} = \dfrac{t}{3}$	Divide each side by 3.
$m = \dfrac{t}{3}$	Simplify.

9. $7a - b = 15a$, for a

$7a - b = 15a$	Original equation
$7a - 7a - b = 15a - 7a$	Subtract $7a$ from each side.
$-b = 8a$	Simplify.
$\dfrac{-b}{8} = \dfrac{8a}{8}$	Divide each side by 8.
$-\dfrac{b}{8} = a$	Simplify.

10. $-5c + d = 2c$, for c

SOLUTION:

$-5c + d = 2c$	Original equation
$-5c + 5c + d = 2c + 5c$	Add $5c$ to each side.
$d = 7c$	Simplify.
$\dfrac{d}{7} = \dfrac{7c}{7}$	Divide each side by 7.
$\dfrac{d}{7} = c$	Simplify.

11. $u = vw + z$, for v

SOLUTION:

$u = vw + z$	Original equation
$u - z = vw + z - z$	Subtract z from each side.
$u - z = vw$	Simplify.
$\dfrac{u - z}{w} = \dfrac{vw}{w}$	Divide each side by w.
$\dfrac{u - z}{w} = v$	Simplify.

12. $x = b - cd$, for c

SOLUTION:

$x = b - cd$	Original equation
$x - b = b - b - cd$	Subtract b from each side.
$x - b = -cd$	Simplify.
$\dfrac{x - b}{-d} = \dfrac{-cd}{-d}$	Divide each side by $-d$.
$-\dfrac{x - b}{d} = c$	Simplify.

13. $fg - 9h = 10j$, for g

SOLUTION:

$$fg - 9h = 10j \qquad \text{Original equation}$$
$$fg - 9h + 9h = 10j + 9h \qquad \text{Add } 9h \text{ to each side.}$$
$$fg = 10j + 9h \qquad \text{Simplify.}$$
$$\frac{fg}{f} = \frac{10j + 9h}{f} \qquad \text{Divide each side by } f.$$
$$g = \frac{10j + 9h}{f} \qquad \text{Simplify.}$$

14. $10m - p = -n$, for m

SOLUTION:

$$10m - p = -n \qquad \text{Original equation}$$
$$10m - p + p = -n + p \qquad \text{Add } p \text{ to each side.}$$
$$10m = -n + p \qquad \text{Simplify.}$$
$$\frac{10m}{10} = \frac{-n + p}{10} \qquad \text{Divide each side by 10.}$$
$$m = \frac{-n + p}{10} \qquad \text{Simplify.}$$

15. $r = \frac{2}{3}t + v$, for t

SOLUTION:

$$r = \frac{2}{3}t + v \qquad \text{Original equation}$$
$$r - v = \frac{2}{3}t + v - v \qquad \text{Subtract } v \text{ from each side.}$$
$$r - v = \frac{2}{3}t \qquad \text{Simplify.}$$
$$\frac{3}{2}(r - v) = \frac{3}{2}\left(\frac{2}{3}\right)t \qquad \text{Multiply each side by } \frac{3}{2}.$$
$$\frac{3}{2}(r - v) = t \qquad \text{Simplify.}$$

16. $\frac{5}{9}v + w = z$, for v

SOLUTION:

$$\frac{5}{9}v + w = z \qquad \text{Original equation}$$
$$\frac{5}{9}v + w - w = z - w \qquad \text{Subtract } w \text{ from each side.}$$
$$\frac{5}{9}v = z - w \qquad \text{Simplify.}$$
$$\frac{9}{5}\left(\frac{5}{9}\right)v = \frac{9}{5}(z - w) \qquad \text{Multiply each side by } \frac{9}{5}.$$
$$v = \frac{9}{5}(z - w) \qquad \text{Simplify.}$$

17. $\frac{10ac - x}{11} = -3$, for a

SOLUTION:

$$\frac{10ac - x}{11} = -3 \qquad \text{Original equation}$$
$$11\left(\frac{10ac - x}{11}\right) = 11(-3) \qquad \text{Multiply each side by 11.}$$
$$10ac - x = -33 \qquad \text{Simplify.}$$
$$10ac - x + x = -33 + x \qquad \text{Add } x \text{ to each side.}$$
$$10ac = -33 + x \qquad \text{Simplify.}$$
$$\frac{10ac}{10c} = \frac{-33 + x}{10c} \qquad \text{Divide each side by } 10c.$$
$$a = \frac{-33 + x}{10c} \qquad \text{Simplify.}$$

18. $\frac{df + 10}{6} = g$, for f

SOLUTION:

$$\frac{df + 10}{6} = g \qquad \text{Original equation}$$
$$6\left(\frac{df + 10}{6}\right) = 6(g) \qquad \text{Multiply each side by 6.}$$
$$df + 10 = 6g \qquad \text{Simplify.}$$
$$df + 10 - 10 = 6g - 10 \qquad \text{Subtract 10 from each side.}$$
$$df = 6g - 10 \qquad \text{Simplify.}$$
$$\frac{df}{d} = \frac{6g - 10}{d} \qquad \text{Divide each side by } d.$$
$$f = \frac{6g - 10}{d} \qquad \text{Simplify.}$$

Write an equation in point-slope form for the line that passes through the given points.

4. $(-4, 6), (-2, 22)$

SOLUTION:

Step 1 Find the slope.

$$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad \text{Slope Formula}$$

$$m = \frac{22 - 6}{-2 - (-4)} = \frac{16}{2} \text{ or } 8 \qquad (x_1, y_1) = (-4, 6) \text{ and } (x_2, y_2) = (-2, 22)$$

Step 2 Write an equation.

$$y - y_1 = m(x - x_1) \qquad \text{Point} - \text{slope form}$$
$$y - 6 = 8[x - (-4)] \qquad (x_1, y_1) = (-4, 6) \text{ and } m = 8$$
$$y - 6 = 8(x + 4) \qquad \text{Simplify.}$$

5. $(1, -3), (4, -15)$

SOLUTION:

Step 1 Find the slope.

$$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad \text{Slope Formula}$$

$$m = \frac{-15 - (-3)}{4 - 1} = \frac{-12}{3} \text{ or } -4 \qquad (x_1, y_1) = (1, -3) \text{ and } (x_2, y_2) = (4, -15)$$

Step 2 Write an equation.

$$y - y_1 = m(x - x_1) \qquad \text{Point} - \text{slope form}$$
$$y - (-3) = -4(x - 1) \qquad (x_1, y_1) = (1, -3) \text{ and } m = -4$$
$$y + 3 = -4(x - 1) \qquad \text{Simplify.}$$

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

SOLUTION:

Step 1 Find the slope.

$$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad \text{Slope Formula}$$

$$m = \frac{-4 - (-6)}{6 - 4} = \frac{2}{2} \text{ or } 1 \qquad (x_1, y_1) = (4, -6) \text{ and } (x_2, y_2) = (6, -4)$$

Step 2 Write an equation.

$$y - y_1 = m(x - x_1) \qquad \text{Point} - \text{slope form}$$
$$y - (-6) = 1(x - 4) \qquad (x_1, y_1) = (4, -6) \text{ and } m = 1$$
$$y + 6 = 1(x - 4) \qquad \text{Simplify.}$$

7. $(3, 3), (6, 7)$

SOLUTION:

Step 1 Find the slope.

$$m = \frac{y_2 - y_1}{x_2 - x_1} \qquad \text{Slope Formula}$$

$$m = \frac{7 - 3}{6 - 3} = \frac{4}{3} \qquad (x_1, y_1) = (3, 3) \text{ and } (x_2, y_2) = (6, 7)$$

Step 2 Write an equation.

$$y - y_1 = m(x - x_1) \qquad \text{Point} - \text{slope form}$$
$$y - 3 = \frac{4}{3}(x - 3) \qquad (x_1, y_1) = (3, 3) \text{ and } m = \frac{4}{3}$$

Solve each compound inequality. Then graph the solution set.
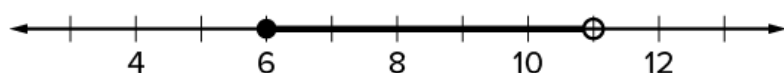
1. $f - 6 < 5$ and $f - 4 \geq 2$

SOLUTION:

Express the compound inequality as two inequalities joined by the word *and*.

$f - 6 < 5$ and $f - 4 \geq 2$
$f - 6 + 6 < 5 + 6$ Add. $f - 4 + 4 \geq 2 + 4$
   $f < 11$ Simplify. $f \geq 6$

The solution set is $\{f \mid 6 \leq f < 11\}$.

Graph the solution set on a number line.
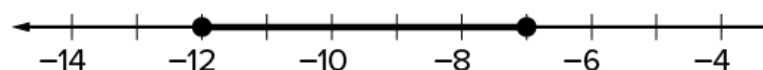

2. $n + 2 \leq -5$ and $n + 6 \geq -6$

SOLUTION:

Express the compound inequality as two inequalities joined by the word *and*.

$n + 2 \leq -5$ and $n + 6 \geq -6$
$n + 2 - 2 \leq -5 - 2$ Subtract. $n + 6 - 6 \geq -6 - 6$
   $n \leq -7$ Simplify. $n \geq -12$

The solution set is $\{n \mid -12 \leq n \leq -7\}$.

Graph the solution set on a number line.

3. $y - 1 \geq 7$ or $y + 3 < -1$

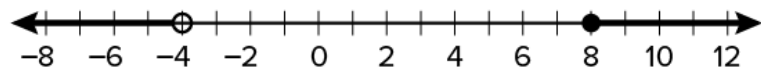**SOLUTION:**

Express the compound inequality as two inequalities joined by the word *or*.

$y - 1 \geq 7$ or $y + 3 < -1$
$y - 1 + 1 \geq 7 + 1$ Add and subtract. $y + 3 - 3 < -1 - 3$
   $y \geq 8$ Simplify. $y < -4$

The solution set is $\{y \mid y \geq 8 \text{ or } y < -4\}$.

Graph the solution set on a number line.
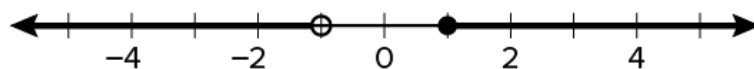

4. $t + 14 \geq 15$ or $t - 9 < -10$

SOLUTION:

Express the compound inequality as two inequalities joined by the word *or*.

$t + 14 \geq 15$ or $t - 9 < -10$
$t + 14 - 14 \geq 15 - 14$ Add and subtract. $t - 9 + 9 < -10 + 9$
   $t \geq 1$ Simplify. $t < -1$

The solution set is $\{t \mid t \geq 1 \text{ or } t < -1\}$.

Graph the solution set on a number line.

5. $-5 < 3p + 7 \leq 22$

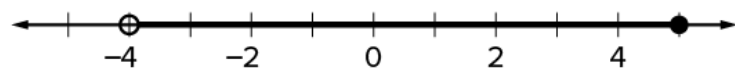**SOLUTION:**

Express the compound inequality as two inequalities joined by the word *and*.

$-5 < 3p + 7$ and $3p + 7 \leq 22$
$-5 - 7 < 3p + 7 - 7$ Subtract. $3p + 7 - 7 \leq 22 - 7$
$-12 < 3p$ Simplify. $3p \leq 15$
$\dfrac{-12}{3} < \dfrac{3p}{3}$ Divide. $\dfrac{3p}{3} \leq \dfrac{15}{3}$
$-4 < p$ Simplify. $p \leq 5$

The solution set is $\{p \mid -4 < p \leq 5\}$.

Graph the solution set on a number line.

6. $-3 \leq 7c + 4 < 18$

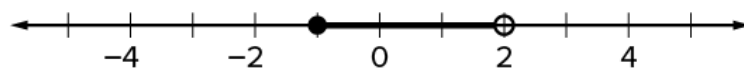**SOLUTION:**

Express the compound inequality as two inequalities joined by the word *and*.

$-3 \leq 7c + 4$ and $7c + 4 < 18$
$-3 - 4 \leq 7c + 4 - 4$ Subtract 4. $7c + 4 - 4 < 18 - 4$
$-7 \leq 7c$ Simplify. $7c < 14$
$\dfrac{-7}{7} \leq \dfrac{7c}{7}$ Divide. $\dfrac{7c}{7} < \dfrac{14}{7}$
$-1 \leq c$ Simplify. $c < 2$

The solution set is $\{c \mid -1 \leq c < 2\}$.

Graph the solution set on a number line.

7. $5h - 4 \geq 6$ and $7h + 11 < 32$

SOLUTION:

Express the compound inequality as two inequalities joined by the word *and*.

$5h - 4 \geq 6$	and	$7h + 11 < 32$
$5h - 4 + 4 \geq 6 + 4$	Add and subtract.	$7h + 11 - 11 < 32 - 11$
$5h \geq 10$	Simplify.	$7h < 21$
$\dfrac{5h}{5} \geq \dfrac{10}{5}$	Divide.	$\dfrac{7h}{7} < \dfrac{21}{7}$
$h \geq 2$	Simplify.	$h < 3$

The solution set is $\{h \mid 2 \leq h < 3\}$.

Graph the solution set on a number line.

8. $22 \geq 4m - 2$ or $5 - 3m \leq -13$

SOLUTION:

Express the compound inequality as two inequalities joined by the word *or*.

$22 \geq 4m - 2$	or	$5 - 3m \leq -13$
$22 + 2 \geq 4m - 2 + 2$	Add and subtract.	$5 - 3m - 5 \leq -13 - 5$
$24 \geq 4m$	Simplify.	$-3m \leq -18$
$\dfrac{24}{4} \geq \dfrac{4m}{4}$	Divide.	$\dfrac{-3m}{-3} \leq \dfrac{-18}{-3}$
$6 \geq m$	Simplify.	$m \geq 6$

The solution set is $\{m \mid m \text{ is a real number.}\}$.
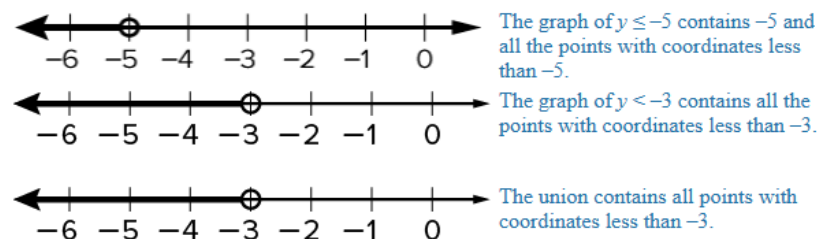
Graph the solution set on a number line.

9. $-y + 5 \geq 9$ or $3y + 4 < -5$

SOLUTION:

Express the compound inequality as two inequalities joined by the word *or*.

$-y + 4 \geq 9$	or	$3y + 4 < -5$
$-y + 4 - 4 \geq 9 - 4$	Subtract.	$3y + 4 - 4 < -5 - 4$
$-y \geq 5$	Simplify.	$3y < -9$
$\dfrac{-y}{-1} \geq \dfrac{5}{-1}$	Divide.	$\dfrac{3y}{3} < \dfrac{-9}{3}$
$y \leq -5$	Simplify.	$y < -3$

Graph the solution set on a number line.

The graph of $y \leq -5$ contains -5 and all the points with coordinates less than -5.

The graph of $y < -3$ contains all the points with coordinates less than -3.

The union contains all points with coordinates less than -3.

Because $y \leq -5$ is contained within $y < -3$, the solution set is $\{y \mid y < -3\}$.

10. $-4a + 13 \geq 29$ and $10 < 6a - 14$

SOLUTION:

Express the compound inequality as two inequalities joined by the word *and*.

$-4a + 13 \geq 29$	and	$10 < 6a - 14$
$-4a + 13 - 13 \geq 29 - 13$	Add and subtract.	$10 + 14 < 6a - 14 + 14$
$-4a \geq 16$	Simplify.	$24 < 6a$
$\dfrac{-4a}{-4} \geq \dfrac{16}{-4}$	Divide.	$\dfrac{24}{6} < \dfrac{6a}{6}$
$a \leq -4$	Simplify.	$4 < a$

The solution set is $\{\varnothing\}$.

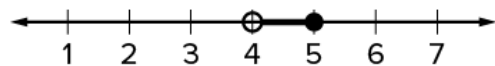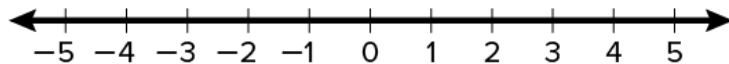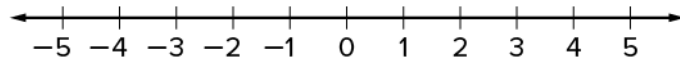Graph the solution set on a number line.

11. $3b + 2 < 5b - 6 \leq 2b + 9$

SOLUTION:

Express the compound inequality as two inequalities joined by the word *and*.

$3b + 2 < 5b - 6$	and	$5b - 6 \leq 2b + 9$
$3b + 2 + 6 < 5b - 6 + 6$	Add.	$5b - 6 + 6 \leq 2b + 9 + 6$
$3b + 8 < 5b$	Simplify.	$5b \leq 2b + 15$
$3b + 8 - 3b < 5b - 3b$	Subtract.	$5b - 2b \leq 2b + 15 - 2b$
$8 < 2b$	Simplify.	$3b \leq 15$
$\dfrac{8}{2} < \dfrac{2b}{2}$	Divide.	$\dfrac{3b}{3} \leq \dfrac{15}{3}$
$4 < b$	Simplify.	$b \leq 5$

The solution set is $\{b \mid 4 < b \leq 5\}$.

Graph the solution set on a number line.

12. $-2a + 3 \geq 6a - 1 > 3a - 10$

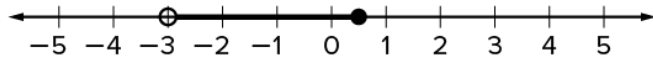**SOLUTION:**

Express the compound inequality as two inequalities joined by the word *and*.

$-2a + 3 \geq 6a - 1$	and	$6a - 1 > 3a - 10$
$-2a + 3 + 1 \geq 6a - 1 + 1$	Add.	$6a - 1 + 1 > 3a - 10 + 1$
$-2a + 4 \geq 6a$	Simplify.	$6a > 3a - 9$
$-2a + 4 + 2a \geq 6a + 2a$	Add and subtract.	$6a - 3a > 3a - 9 - 3a$
$4 \geq 8a$	Simplify.	$3a > -9$
$\dfrac{4}{8} \geq \dfrac{8a}{8}$	Divide.	$\dfrac{3a}{3} > \dfrac{-9}{3}$
$\dfrac{1}{2} \geq a$	Simplify.	$a > -3$

The solution set is $\left\{a \mid -3 < a \leq \dfrac{1}{2}\right\}$.

Graph the solution set on a number line.

13. $10m - 7 < 17m$ or $-6m > 36$
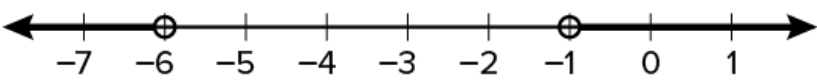
SOLUTION:

Express the compound inequality as two inequalities joined by the word *or*.

$10m - 7 < 17m$	or	$-6m > 36$	
$10m - 7 - 10m < 17m - 10m$	Subtract.	$-6m > 36$	
$-7 < 7m$	Simplify.	$-6m > 36$	
$\dfrac{-7}{7} < \dfrac{7m}{7}$	Divide.	$\dfrac{-6m}{-6} > \dfrac{36}{-6}$	
$-1 < m$	Simplify.	$m < -6$	

The solution set is $\{m \mid m < -6 \text{ or } m > -1\}$.

Graph the solution set on a number line.
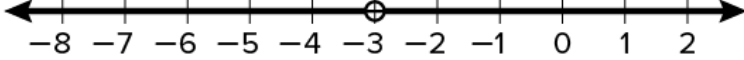

14. $5n - 1 < -16$ or $-3n - 1 < 8$

SOLUTION:

Express the compound inequality as two inequalities joined by the word *or*.

$5n - 1 < -16$	or	$-3n - 1 < 8$	
$5n - 1 + 1 < -16 + 1$	Add.	$-3n - 1 + 1 < 8 + 1$	
$5n < -15$	Simplify.	$-3n < 9$	
$\dfrac{5n}{5} < \dfrac{-15}{5}$	Divide.	$\dfrac{-3n}{-3} < \dfrac{9}{-3}$	
$n < -3$	Simplify.	$n > -3$	

The solution set is $\{n \mid n < -3 \text{ or } n > -3\}$.

Graph the solution set on a number line.

15. $m + 3 \geq 5$ and $m + 3 < 7$

SOLUTION:

Express the compound inequality as two inequalities joined by the word *and*.

$m + 3 \geq 5$	and	$m + 3 < 7$	
$m + 3 - 3 \geq 5 - 3$	Subtract.	$m + 3 - 3 < 7 - 3$	
$m \geq 2$	Simplify.	$m < 4$	

The solution set is $\{m \mid 2 \leq m < 4\}$.

Graph the solution set on a number line.

16. $y - 5 < -4$ or $y - 5 \geq 1$

SOLUTION:

Express the compound inequality as two inequalities joined by the word *or*.

$y - 5 < -4$	or	$y - 5 \geq 1$	
$y - 5 + 5 < -4 + 5$	Add.	$y - 5 + 5 \geq 1 + 5$	
$y < 1$	Simplify.	$y \geq 6$	

The solution set is $\{y \mid y < 1 \text{ or } y \geq 6\}$.

Graph the solution set on a number line.

تم بحمد الله