3. Copy and complete each table of values.

a) $y = x + 4$

x	y
2	
1	
0	
−1	
−2	

b) $y = 2x - 3$

x	y
2	
1	
0	
−1	
−2	

c) $y = -x + 5$

x	y
4	
2	
0	
−2	
−4	

d) $y = x^2 + 1$

x	y
2	
1	
0	
−1	
−2	

e) $y = x^2 + 2x$

x	y
2	
1	
0	
−1	
−2	

f) $y = x^2 - 2x + 4$

x	y
4	
2	
0	
−2	
−4	

Evaluating radicals

Since $7 \times 7 = 49$, $\sqrt{49} = 7$.

Since $0.4 \times 0.4 = 0.16$, $\sqrt{0.16} = 0.4$.

1. Evaluate.

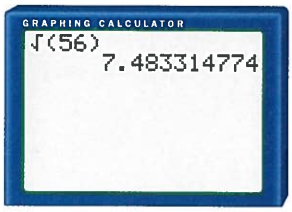
a) $\sqrt{4}$ **b)** $\sqrt{25}$ **c)** $\sqrt{0.81}$ **d)** $\sqrt{1.21}$

e) $\sqrt{0.09}$ **f)** $\sqrt{0.01}$ **g)** $\sqrt{225}$ **h)** $\sqrt{1.69}$

To evaluate $\sqrt{56}$, to the nearest tenth, use a calculator.

$\sqrt{56} \doteq 7.483314774$

so $\sqrt{56} = 7.5$, to the nearest tenth.



2. Evaluate, to the nearest tenth.

a) $\sqrt{44}$ **b)** $\sqrt{129}$ **c)** $\sqrt{3422}$ **d)** $\sqrt{20.5}$

e) $\sqrt{89.4}$ **f)** $\sqrt{747}$ **g)** $\sqrt{65\ 771}$ **h)** $\sqrt{0.7}$

Expanding expressions

To expand $3x(x - 4)$, use the distributive property.

$$\begin{aligned} 3x(x - 4) &= 3x(x - 4) \\ &= 3x^2 - 12x \end{aligned}$$

1. Expand.

a) $2(x + 3)$ **b)** $3(x + y - 7)$ **c)** $5(a - b + c)$

d) $-2(5a - 4)$ **e)** $-(2x - y)$ **f)** $x(x + 6)$

g) $2x(3x + 7)$ **h)** $x(x^2 - x + 5)$ **i)** $-3a(a^2 + 2a - 1)$

Exponent rules

To multiply powers with the same base, add the exponents.

$x^2 \times x^3 = x^{2+3}$
$= x^5$

To divide powers with the same base, subtract the exponents.

$x^5 \div x^2 = x^{5-2}$
$= x^3$

To raise a power to a power, multiply the exponents.

$(x^2)^4 = x^{2 \times 4}$
$= x^8$

1. Simplify, using the exponent rules. Express each answer in exponential form.

a) $2^2 \times 2^5$ **b)** $3^6 \times 3^4$ **c)** $4^2 \times 4^3 \times 4^2$ **d)** $5^3 \times 5^2 \times 5$
e) $2^5 \div 2^3$ **f)** $3^7 \div 3^4$ **g)** $4^6 \div 4$ **h)** $(2^3)^2$
i) $(3^4)^3$ **j)** $y^4 \times y^7$ **k)** $z^3 \times z^3$ **l)** $y^5 \div y^4$
m) $z^8 \div z^2$ **n)** $(x^3)^5$ **o)** $(y^2)^8$ **p)** $3x^4 \times 2x^3$
q) $(-2y^3)(-4y^4)$ **r)** $-10m^7 \div (-2m^3)$ **s)** $(3y^3)^2$ **t)** $(-2x^3)^3$

First differences

First differences are calculated from tables of values in which the x-coordinates are evenly spaced. First differences are found by subtracting consecutive y-coordinates.
If the first differences are constant, the relation is linear. If the first differences are not constant, the relation is non-linear.

This relation is linear.

x	y	1st Difference
1	3	
		5 – 3 = 2
2	5	
		7 – 5 = 2
3	7	
		9 – 7 = 2
4	9	

This relation is non-linear.

x	y	1st Difference
1	1	
		4 – 1 = 3
2	4	
		9 – 4 = 5
3	9	
		16 – 9 = 7
4	16	

1. Use first differences to determine whether each relation is linear or non-linear.

a)

x	y
1	5
2	8
3	11
4	14

b)

x	y
1	7
2	5
3	3
4	1

c)

x	y
1	2
2	5
3	10
4	17

d)

x	y
1	2
2	6
3	10
4	14

Simplifying expressions

To simplify $3(x + 2) - (x - 4)$, remove brackets and collect like terms.

$$\begin{aligned} 3(x + 2) - (x - 4) &= 3(x + 2) - 1(x - 4) \\ &= 3x + 6 - x + 4 \\ &= 2x + 10 \end{aligned}$$

1. Simplify.

a) $5x + 2(x + 7)$ **b)** $3(2a - 7) + 3a$ **c)** $4(x - 3) - 2x$

d) $-5(y - 3) + 6$ **e)** $2(t + 4) + 3(t - 4)$ **f)** $8(y - 3) - (y + 6)$

g) $-4(z + 3) - 2(z - 2)$ **h)** $7(2 - w) - (w - 3)$ **i)** $6(x - 4) + 2(3 + x)$

2. Simplify.

a) $(3x + 4y) + (2x + 3y)$ **b)** $(4r - 3s) + (r + 4s)$ **c)** $(3p + 5q) - (4p - q)$

d) $2(x - 3y) + 3(6x - y)$ **e)** $4(3a + 5b) - (7a - b)$ **f)** $-4(c - 5d) + 3c - d$

g) $4a - b + 3c - 2(a + b - c)$ **h)** $3(x + y - 2z) + 7x - 5$ **i)** $6x + 4(2x + 3y - z) + 5y$

Slope

To find the slope of the line passing through the points (–2, 1) and (3, 5), use the formula for slope.

$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} \\ &= \frac{5 - 1}{3 - (-2)} \\ &= \frac{4}{5} \end{aligned}$$

1. Find the slope of the line passing through each of the following pairs of points.

a) (0, 0) and (2, 6) **b)** (0, 0) and (4, 2) **c)** (1, 2) and (3, 6)

d) (2, 5) and (3, 7) **e)** (3, 0) and (0, 6) **f)** (–3, 5) and (2, 6)

g) (–4, 2) and (5, 2) **h)** (–3, –4) and (–1, –8) **i)** (5, –7) and (3, –10)

Parallel lines have the same slope. The slope of the line parallel to $y = 2x + 3$ is 2.

The product of the slopes of perpendicular lines is –1.

The slope of the line perpendicular to $y = 2x + 3$ is $-\frac{1}{2}$, since $2 \times -\frac{1}{2} = -1$.

2. State the slope of a line parallel to and a line perpendicular to each of the following lines.

a) $y = 3x + 5$ **b)** $y = -2x - 4$ **c)** $y = -x + 7$

d) $y = \frac{1}{4}x - 4$ **e)** $y = -\frac{2}{3}x + 1$ **f)** $y = \frac{4}{5}x - 6$