Math Review Task
Grade 8

Mathletics

Equations:

How does it work? | Solutions | Equations

Keeping things in balance

1 a Left-hand side n Right-hand side 3

Equation: $n = 3$

b Left-hand side w Right-hand side 5

Equation: $w = 5$

c Left-hand side $3x$ Right-hand side 2

Equation: $3x = 2$

d Left-hand side $2m + 1$ Right-hand side $m + 2$

Equation: $2m + 1 = m + 2$

2 a Left-hand side $n + 1$ Right-hand side $3 + 1$

Equation: $n + 1 = 4$

b Left-hand side $w + 3$ Right-hand side $5 + 3$

Equation: $w + 3 = 8$

c Left-hand side $3x + 1$ Right-hand side $2 + 1$

Equation: $3x + 1 = 3$

d Left-hand side $2(2m + 1)$ Right-hand side $2(m + 2)$

Equation: $4m + 2 = 2m + 4$

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Grade 8

Mathletics

Equations:

How does it work? | Solutions | Equations

Solving simple equations

1 **a** $s + 5 = 15$ $\therefore s =$ **10**

b $t - 5 = 24$ $\therefore t =$ **29**

c $a \div 6 = 6$ $\therefore a =$ **36**

d $11 - r = 2$ $\therefore r =$ **9**

e $p + 6 = 35$ $\therefore p =$ **29**

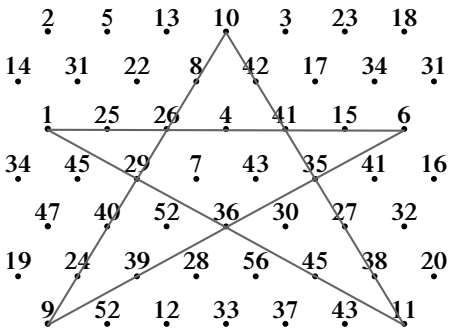
f $18 \times o = 18$ $\therefore o =$ **1**

g $42 \div i = 7$ $\therefore i =$ **6**

h $16 + n = 52$ $\therefore n =$ **36**

i $44 \div t = 4$ $\therefore t =$ **11**

j $2.5 \times s = 25$ $\therefore s =$ **10**



2 **a** $x + 7 = 16$ $\therefore x =$ **9**

b $y + 15 = 13$ $\therefore y =$ **−2**

c $m - 3 = 8$ $\therefore m =$ **11**

d $a - 12 = 5$ $\therefore a =$ **17**

e $3k = 27$ $\therefore k =$ **9**

f $14w = 42$ $\therefore w =$ **3**

g $q \div 4 = 24$ $\therefore q =$ **96**

h $z \div (-2) = 8$ $\therefore z =$ **−16**

i $b - 13 = -7$ $\therefore b =$ **6**

j $15 + g = -4$ $\therefore g =$ **−19**

k $-2r = -13$ $\therefore r =$ **6.5**

l $48 \div p = 3$ $\therefore p =$ **16**

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Mathletics

Equations:

How does it work? | Solutions | Equations

Two-step equations

1 a

$$\begin{aligned} 3x+5 &= 14 \\ 3x+5-5 &= 14-5 \\ 3x &= 9 \\ 3x \div 3 &= 9 \div 3 \\ x &= 3 \end{aligned}$$

b

$$\begin{aligned} 6g-1 &= 27 \\ 6g-1+1 &= 27+1 \\ 6g &= 28 \\ 6g \div 6 &= 28 \div 6 \\ g &= 4\tfrac{2}{3} \end{aligned}$$

c

$$\begin{aligned} 4a+11 &= 39 \\ 4a+11-11 &= 39-11 \\ 4a &= 28 \\ 4a \div 4 &= 28 \div 4 \\ a &= 7 \end{aligned}$$

d

$$\begin{aligned} 5w-12 &= 18 \\ 5w-12+12 &= 18+12 \\ 5w &= 30 \\ 5w \div 5 &= 30 \div 5 \\ w &= 6 \end{aligned}$$

e

$$\begin{aligned} 2b+12 &= 8 \\ 2b+12-12 &= 8-12 \\ 2b &= -4 \\ 2b \div 2 &= -4 \div 2 \\ b &= -2 \end{aligned}$$

f

$$\begin{aligned} 3n-5 &= -8 \\ 3n-5+5 &= -8+5 \\ 3n &= -3 \\ 3n \div 3 &= -3 \div 3 \\ n &= -1 \end{aligned}$$

g

$$\begin{aligned} 10-2m &= 18 \\ 10-2m-10 &= 18-10 \\ -2m &= 8 \\ -2m \div (-2) &= 8 \div (-2) \\ m &= -4 \end{aligned}$$

h

$$\begin{aligned} 25-6p &= -29 \\ 25-6p-25 &= -29-25 \\ -6 &= -54 \\ -6p \div -6 &= -54 \div -6 \\ p &= 9 \end{aligned}$$

i

$$\begin{aligned} 3-g &= 8 \\ 3-g-3 &= 8-3 \\ -g &= 5 \\ -g \div (-1) &= 5 \div (-1) \\ g &= -5 \end{aligned}$$

j

$$\begin{aligned} 15-y &= 16 \\ 15-y-15 &= 16-15 \\ -y &= 1 \\ -y \div (-1) &= 1 \div (-1) \\ y &= -1 \end{aligned}$$

k

$$\begin{aligned} 9-q &= 4 \\ 9-q-9 &= 4-9 \\ -q &= -5 \\ -q \div (-1) &= -5 \div (-1) \\ q &= 5 \end{aligned}$$

l

$$\begin{aligned} 25 &= 13-n \\ 25-13 &= 13-n-13 \\ 12 &= -n \\ 12 \div (-1) &= -n \div (-1) \\ -12 &= n \\ n &= -12 \end{aligned}$$

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Equations:

How does it work? | Solutions | Equations

Equations with fractions

1 a

$$\frac{3v}{4} = 6$$
$$\frac{3v}{4} \times 4 = 6 \times 4$$
$$3v = 24$$
$$3v \div 3 = 24 \div 3$$
$$v = 8$$

b

$$\frac{7t}{3} = 21$$
$$\frac{7t}{3} \times 3 = 21 \times 3$$
$$7t = 63$$
$$7t \div 7 = 63 \div 7$$
$$t = 9$$

c

$$\frac{3u}{2} = -12$$
$$\frac{3u}{2} \times 2 = -12 \times 2$$
$$3u = -24$$
$$3u \div 3 = -24 \div 3$$
$$u = -8$$

d

$$\frac{-6h}{5} = 4$$
$$\frac{-6h}{5} \times 5 = 4 \times 5$$
$$-6h = 20$$
$$-6h \div (-6) = 20 \div (-6)$$
$$h = -3\frac{1}{3}$$

2 a

$$\frac{x+4}{3} = 6$$
$$\frac{x+4}{3} \times 3 = 6 \times 3$$
$$x + 4 = 18$$
$$x + 4 - 4 = 18 - 4$$
$$x = 14$$

b

$$\frac{y-12}{4} = 2$$
$$\frac{y-12}{4} \times 4 = 2 \times 4$$
$$y - 12 = 8$$
$$y - 12 + 12 = 8 + 12$$
$$y = 20$$

c

$$\frac{d-16}{2} = -9\frac{1}{2}$$
$$\frac{d-16}{2} \times 2 = -9\frac{1}{2} \times 2$$
$$d - 16 = -19$$
$$d - 16 + 16 = -19 + 16$$
$$d = -3$$

d

$$-5 = \frac{8+a}{2}$$
$$-5 \times 2 = \frac{8+a}{2} \times 2$$
$$-10 = 8 + a$$
$$-10 - 8 = 8 + a - 8$$
$$a = -18$$

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Mathletics

Equations:

How does it work? | Solutions | Equations

Combo Time: Multi-step equations

1

$$\frac{2x-5}{3} = -9$$
$$\frac{2x-5}{3} \times 3 = -9 \times 3$$
$$2x-5 = -27$$
$$2x-5+5 = -27+5$$
$$2x = -22$$
$$2x \div 2 = -22 \div 2$$
$$x = -11$$

2

$$\frac{7+5y}{2} = 16$$
$$\frac{7+5y}{2} \times 2 = 16 \times 2$$
$$7+5y = 32$$
$$7+5y-7 = 32-7$$
$$5y = 25$$
$$5y \div 5 = 25 \div 5$$
$$y = 5$$

3

$$\frac{5b+1}{7} = \frac{2b}{3}$$
$$3 \times (5b+1) = 7 \times (2b)$$
$$15b+3 = 14b$$
$$15b+3-15b = 14b-15b$$
$$3 = -b$$
$$3 \div (-1) = -b \div (-1)$$
$$b = -3$$

4

$$\frac{3a-2}{5} = \frac{4a}{6}$$
$$6 \times (3a-2) = 5 \times (4a)$$
$$18a-12 = 20a$$
$$18a-12-18a = 20a-18a$$
$$-12 = 2a$$
$$-12 \div 2 = 2a \div 2$$
$$a = -6$$

Math Review Task
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Mathletics

Equations:

How does it work? | Solutions | Equations

Combo Time: Multi-step equations

5
$$\frac{15h}{4} = \frac{14h+11}{3}$$
$$3\times(15h) = 4\times(14h+11)$$
$$45h = 56h+44$$
$$45h-56h = 56h+44-56h$$
$$-11h = 44$$
$$-11h\div(-11) = 44\div(-11)$$
$$h = -4$$

6
$$3(2+q) = 6(4+q)$$
$$6+3q = 24+6q$$
$$6+3q-3q = 24+6q-3q$$
$$6 = 24+3q$$
$$6-24 = 24+3q-24$$
$$-18 = 3q$$
$$-18\div 3 = 3q\div 3$$
$$q = -6$$

7
$$3(4n+1) = 5(4-n)$$
$$12n+3 = 20-5n$$
$$12n+3+5n = 20-5n+5n$$
$$17n+3 = 20$$
$$17n+3-3 = 20-3$$
$$17n = 17$$
$$17n\div 17 = 17\div 17$$
$$n = 1$$

8
$$-8(k-2) = 6(k+2)$$
$$-8k+16 = 6k+12$$
$$-8k+16+8k = 6k+12+8k$$
$$16 = 14k+12$$
$$16-12 = 14k+12-12$$
$$4 = 14k$$
$$4\div 14 = 14k\div 14$$
$$k = \frac{4}{14}$$
$$k = \frac{2}{7}$$

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Equations:

How does it work? | Solutions | Equations

Formulae

1 a (i)
$$S = \frac{D}{T}$$
$$S = \frac{140}{2}$$
$$S = 80 \text{ km/h}$$
$\therefore$ The speed is 80 km/h

(ii)
$$S = \frac{D}{T}$$
$$S = \frac{31.5}{0.5}$$
$$S = 63 \text{ km/h}$$
$\therefore$ The speed is 63 km/h

b (i)
$$C = 32^\circ$$
$$\therefore F = \frac{9 \times 32 + 160}{5}$$
$$= \frac{288 + 160}{5}$$
$$= \frac{448}{5}$$
$$= 89.6^\circ F$$
$\therefore$ The converted temperature is $89.6^\circ F$

(ii)
$$C = 0^\circ$$
$$\therefore F = \frac{9 \times 0 + 160}{5}$$
$$= \frac{160}{5}$$
$$= 32^\circ F$$
$\therefore$ The converted temperature is $32^\circ F$

2 a (i)
$$A = lb$$
$$36 = l \times 4$$
$$36 \div 4 = l \times 4 \div 4$$
$$l = 9$$
$\therefore$ The length of the rectangle is 9 cm

(ii)
$$A = lb$$
$$25.48 = l \times 2.6$$
$$25.48 \div 2.6 = l \times 2.6 \div 2.6$$
$$l = 9.8$$
$\therefore$ The length of the rectangle is 9.8 cm

b (i)
$$21 = \frac{a + 28}{2}$$
$$21 \times 2 = \frac{a + 28}{2} \times 2$$
$$42 - 28 = a + 28 - 28$$
$$a = 14$$
$\therefore$ The number $a = 10$

(ii)
$$4.75 = \frac{a + 3.6}{2}$$
$$4.75 \times 2 = \frac{a + 3.6}{2} \times 2$$
$$9.5 = a + 3.6$$
$$9.5 - 3.6 = a + 3.6 - 3.6$$
$$a = 5.9$$
$\therefore$ The number $a = 5.9$

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Mathletics

Linear Relationships:

How does it work? | Solutions | Linear Relationships

Rearranging linear relationships

1 a (i) $4y = 8x - 12$

$\div 4 \quad \div 4 \quad \div 4$

$y = 2x - 3$

$\therefore$ (ii) Gradient (m) $= 2 = \frac{+2}{+1}$

y-intercept (b) $= -3$

b (i) $2y = 14x + 6$

$\div 2 \quad \div 2 \quad \div 2$

$y = 7x + 3$

$\therefore$ (ii) Gradient (m) $= 7 = \frac{+7}{+1}$

y-intercept (b) $= +3$

c (i) $10y - 10x = 25$

$\div 10 \quad \div 10 \quad \div 10$

$10y = 10x + 25$

$\div 10 \quad \div 10 \quad \div 10$

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

$\therefore$ (ii) Gradient (m) $= 1 = \frac{+1}{+1}$

y-intercept (b) $= +2\frac{1}{2}$

d (i) $4y + 3x = 12$

$-3x \quad -3x$

$4y = -3x + 12$

$\div 4 \quad \div 4 \quad \div 4$

$y = -\frac{3}{4}x + 3$

$\therefore$ (ii) Gradient (m) $= -\frac{3}{4} = \frac{-3}{+4}$

y-intercept (b) $= +3$

e (i) $6x + 2y = 1$

$-6x \quad -6x$

$2y = 1 - 6x$

$\div 2 \quad \div 2 \quad \div 2$

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

$\therefore$ (ii) Gradient (m) $= -3 = \frac{-3}{+1}$

y-intercept (b) $= +\frac{1}{2}$

f (i) $8x - 4y = 16$

$-8x \quad -8x$

$-4y = 16 - 8x$

$\div -4 \quad \div -4 \quad \div -4$

$y = 2x - 4$

$\therefore$ (ii) Gradient (m) $= 2 = \frac{+2}{+1}$

y-intercept (b) $= -4$

Math Review Task
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Mathletics

Linear Relationships:

How does it work? | Solutions | Linear Relationships

Rearranging linear relationships

2 a (i) $\frac{y}{3} = x - 1$

$\times 3 \quad \times 3 \quad \times 3$

$y = 3x - 3$

$\therefore$ (ii) Gradient (m) $= 3 = \frac{+3}{+1}$

y-intercept (b) $= -3$

b (i) $\frac{1}{2}y = 2x + 3$

$\div\frac{1}{2} \quad \div\frac{1}{2} \quad \div\frac{1}{2}$ or multiply $2x + 3$ by 2

$y = 4x + 6$

$\therefore$ (ii) Gradient (m) $= 4 = \frac{+4}{+1}$

y-intercept (b) $= +6$

c (i) $\frac{y - x}{3} = 2$

$\times 3 \quad \times 3$

$y - x = 6$

$+x \quad +x$

$y = x + 6$

$\therefore$ (ii) Gradient (m) $= 1 = \frac{+1}{+1}$

y-intercept (b) $= +6$

d (i) $\frac{2y + 6x}{5} = 6$

$\times 5 \quad \times 5$

$2y + 6x = 30$

$-6x \quad -6x$

$2y = 30 - 6x$

$\div 2 \quad \div 2 \quad \div 2$

$y = 15 - 3x$

$\therefore$ (ii) Gradient (m) $= -3 = \frac{-3}{+1}$

y-intercept (b) $= +15$

e (i) $\frac{5y + 4x}{2} = 1$

$\times 2 \quad \times 2$

$5y + 4x = 2$

$-4x \quad -4x$

$5y = 2 - 4x$

$\div 5 \quad \div 5 \quad \div 5$

$y = \frac{2}{5} - \frac{4x}{5}$

$\therefore$ (ii) Gradient (m) $= -\frac{4}{5} = \frac{-4}{+5}$

y-intercept (b) $= +\frac{2}{5}$

f (i) $5y + 3x = \frac{5}{3}$

$-3x \quad -3x$

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

$\div 5 \quad \div 5 \quad \div 5$

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

$\therefore$ (ii) Gradient (m) $= -\frac{3}{5} = \frac{-3}{+5}$

y-intercept (b) $= +\frac{1}{3}$

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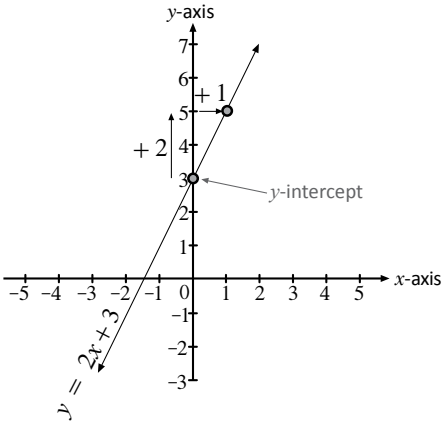
Mathletics

Linear Relationships:

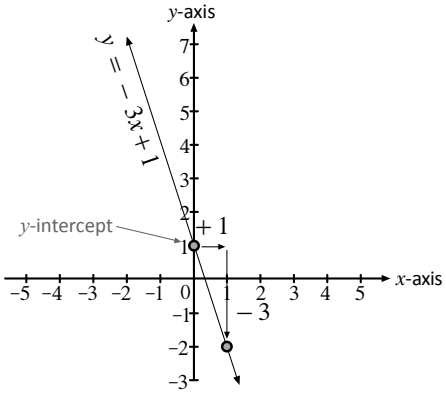
How does it work? | Solutions | Linear Relationships

Graphing using the intercept and gradient

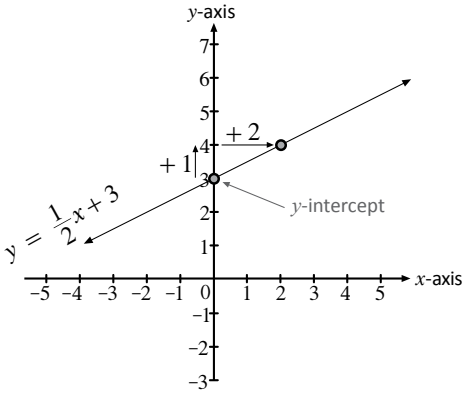
1 a $y = 2x + 3$



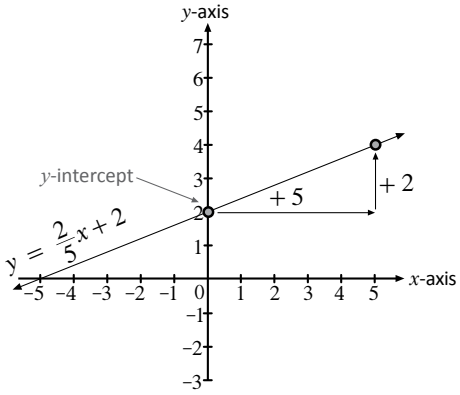
b $y = -3x + 1$



c $y = \frac{1}{2}x + 3$



d $y = \frac{2}{5}x + 2$



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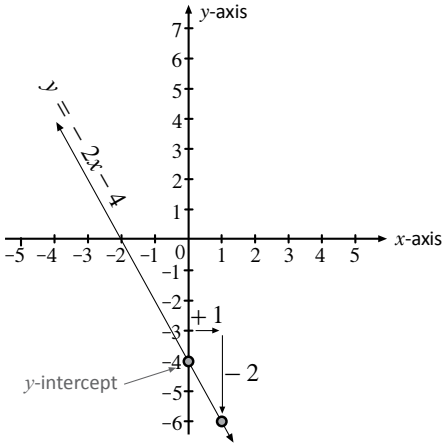
Linear Relationships:

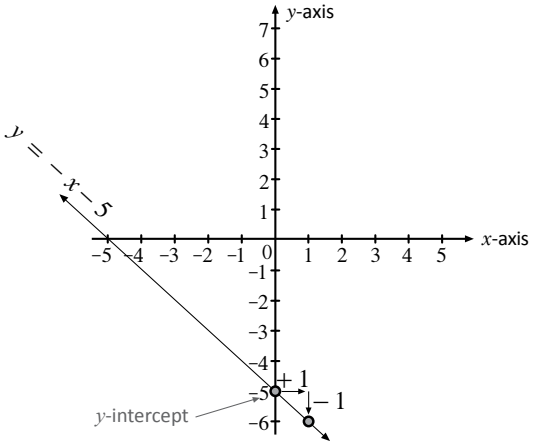
How does it work? | Solutions | Linear Relationships

Graphing using the intercept and gradient

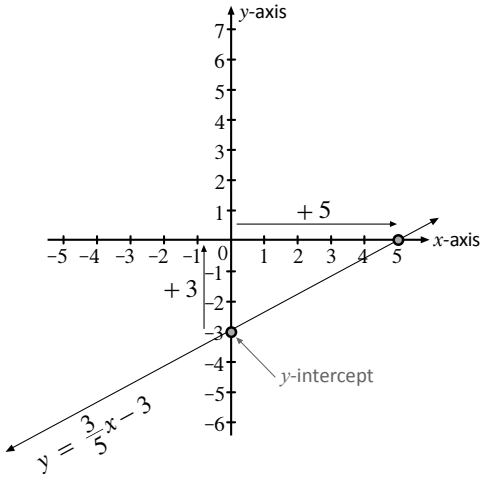
2 a $y = -2x - 4$



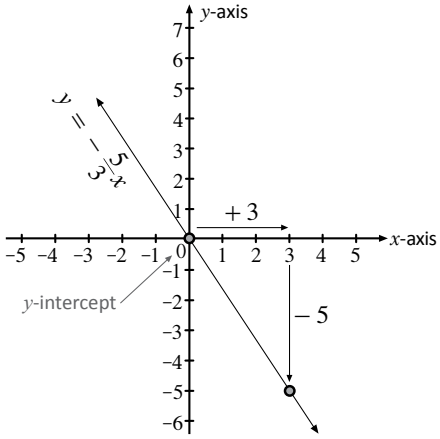
b $y = -x - 5$



c $y = \frac{3}{5}x - 3$



d $y = -\frac{5}{3}x$



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Linear Relationships:

How does it work? | Solutions | Linear Relationships

Comparing graphs

1 a $y = 2x + 3$ and $y = 1 + 2x$

Parallel ✓ Not Parallel

b $x + y = 4$ and $y = x - 4$

Parallel Not Parallel ✓

c $y = \frac{x}{3}$ and $y = 1 + \frac{1}{3}x$

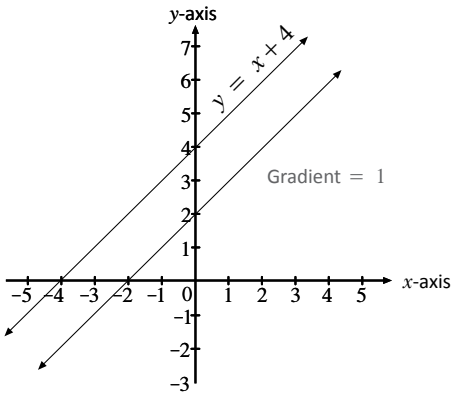
Parallel ✓ Not Parallel

d $y - 2x = 2$ and $y = 2 - 2x$

Parallel Not Parallel ✓

2 a $y = x + 4$

Parallel ✓ Not Parallel



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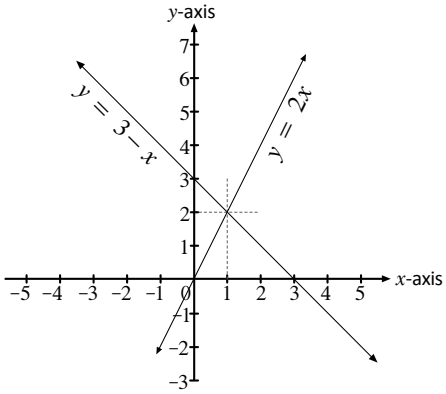
Linear Relationships:

How does it work? | Solutions | Linear Relationships

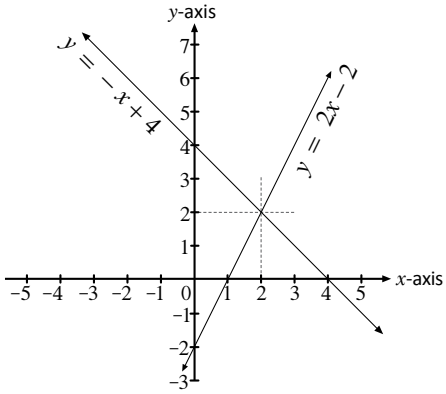
Intersection of two linear graphs

1 **a** $y = 3 - x$ and $y = 2x$



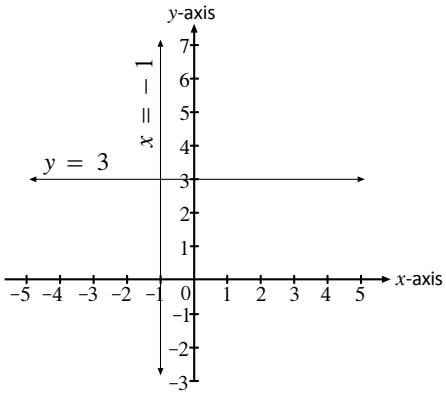
Point of intersection: (1 , 2)

b $y = 2x - 2$ and $y = -x + 4$



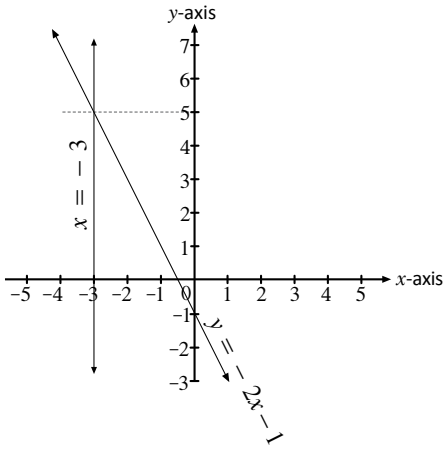
Point of intersection: (2 , 2)

c $y = 3$ and $x = -1$



Point of intersection: (−1 , 3)

d $x = -3$ and $y = -2x - 1$



Point of intersection: (−3 , 5)

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Percentage Calculations:

How does it work? | Solutions | Percentage Calculations

Fractions and percentages

1 a $\frac{3}{100} = \frac{\boxed{3}}{} \%$ b $\frac{41}{100} = \frac{\boxed{41}}{} \%$ c $\frac{110}{100} = \frac{\boxed{110}}{} \%$ d $\frac{200}{100} = \frac{\boxed{200}}{} \%$

2 a $7\% = \frac{\boxed{7}}{\boxed{100}}$ b $89\% = \frac{\boxed{89}}{\boxed{100}}$ c $117\% = \frac{\boxed{117}}{\boxed{100}}$ d $336\% = \frac{\boxed{336}}{\boxed{100}}$

3 a $20\% = \frac{\boxed{20}}{\boxed{100}} = \frac{\boxed{1}}{\boxed{5}}$ Simplified

b $15\% = \frac{\boxed{15}}{\boxed{100}} = \frac{\boxed{3}}{\boxed{20}}$ Simplified

c $80\% = \frac{\boxed{80}}{\boxed{100}} = \frac{\boxed{4}}{\boxed{5}}$ Simplified

d $24\% = \frac{\boxed{24}}{\boxed{100}} = \frac{\boxed{6}}{\boxed{25}}$ Simplified

e $42\% = \frac{\boxed{42}}{\boxed{100}} = \frac{\boxed{21}}{\boxed{50}}$ Simplified

f $96\% = \frac{\boxed{96}}{\boxed{100}} = \frac{\boxed{24}}{\boxed{25}}$ Simplified

g $125\% = \frac{\boxed{125}}{\boxed{100}} = \frac{\boxed{5}}{\boxed{4}}$ Simplified improper

h $180\% = \frac{\boxed{180}}{\boxed{100}} = \frac{\boxed{9}}{\boxed{5}}$ Simplified improper

i $350\% = \frac{\boxed{350}}{\boxed{100}} = \frac{\boxed{7}}{\boxed{2}}$ Simplified improper

4 a $\frac{24}{300} = \frac{24 \div \boxed{3}}{300 \div \boxed{3}} = \frac{\boxed{8}}{\boxed{100}} = \boxed{8} \%$

b $\frac{48}{200} = \frac{48 \div \boxed{2}}{200 \div \boxed{2}} = \frac{\boxed{24}}{\boxed{100}} = \boxed{24} \%$

c $\frac{175}{500} = \frac{175 \div \boxed{5}}{500 \div \boxed{5}} = \frac{\boxed{35}}{\boxed{100}} = \boxed{35} \%$

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Percentage Calculations:

How does it work? | Solutions | Percentage Calculations

Decimals and percentages

1 a $15\% = 0.15$ b $20\% = 0.20$ c $4\% = 0.04$ d $9\% = 0.09$

e $125\% = 1.25$ f $250\% = 2.50$ g $110\% = 1.10$ h $305\% = 3.05$

2 a $0.03 = 3\%$ b $0.16 = 16\%$ c $1.12 = 112\%$ d $2.45 = 245\%$

e $0.125 = 12.5\%$ f $0.253 = 25.3\%$ g $0.018 = 1.8\%$ h $0.2225 = 22.25\%$

3 a $0.015 = 1.5\%$ (Decimal) $= \frac{3}{2}\%$ (Improper fraction)

b $0.185 = 18.5\%$ (Decimal) $= 18\frac{1}{2}\%$ (Mixed number)

c $0.012 = 1.2\%$ (Decimal) $= \frac{6}{5}\%$ (Improper fraction)

d $0.458 = 45.8\%$ (Decimal) $= 45\frac{4}{5}\%$ (Mixed number)

4 a $155\% = 1.55$ (Decimal) $= 1\frac{11}{20}$ (Mixed number) $= \frac{31}{20}$ (Improper fraction)

b $218\% = 2.18$ (Decimal) $= 2\frac{9}{50}$ (Mixed number) $= \frac{109}{50}$ (Improper fraction)

c $100.5\% = 1.005$ (Decimal) $= 1\frac{1}{200}$ (Mixed number) $= \frac{201}{200}$ (Improper fraction)

d $220.4\% = 2.204$ (Decimal) $= 2\frac{51}{250}$ (Mixed number) $= \frac{551}{250}$ (Improper fraction)

e $375.20\% = 3.752$ (Decimal) $= 3\frac{94}{125}$ (Mixed number) $= \frac{469}{125}$ (Improper fraction)

f $125.8\% = 1.258$ (Decimal) $= 1\frac{129}{500}$ (Mixed number) $= \frac{629}{500}$ (Improper fraction)

Math Review Task
Grade 8

Mathletics

Percentage Calculations:

How does it work? | Solutions | Percentage Calculations

Percentages of an amount

1 **a** $15\% \text{ of } 40 = \frac{15}{100} \times 40$

$= 6$

b $28\% \text{ of } 75 = \frac{28}{100} \times 75$

$= 21$

c $65\% \text{ of } 60 = \{65 \times 100\} \times 60$

$= 0.65 \times 60$

$= 39$

d $22.5\% \text{ of } 280 = \{22.5 \div 100\} \times 280$

$= 0.225 \times 280$

$= 63$

2 **a** $\frac{20}{100} \times 65 = 0.2 \times 65$

$= 13$

b $\frac{60}{100} \times 35 = 0.6 \times 35$

$= 21$

c $\frac{22}{100} \times 25 = 0.22 \times 25$

$= 5.5$

d $\frac{15}{100} \times 30 = 0.15 \times 30$

$= 4.5$

e $\frac{67.5}{100} \times 48 = 0.675 \times 48$

$= 32.4$

f $\frac{34.5}{100} \times 14 = 0.345 \times 14$

$= 4.83$

g $\frac{125}{100} \times 12 = 1.25 \times 12$

$= 15$

h $\frac{220}{100} \times 40 = 2.20 \times 40$

$= 88$

i $\frac{150}{100} \times 15 = 1.5 \times 315$

$= 22.5$

j $\frac{175}{100} \times 79 = 1.75 \times 79$

$= 138.25$

Math Review Task
Grade 8

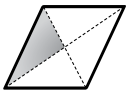
Mathletics

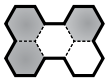
Percentage Calculations:

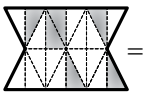
How does it work? | Solutions | Percentage Calculations

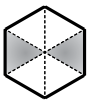
Percentages of an amount

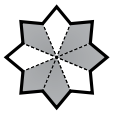
3 a  = 50 %

b  = 25 %

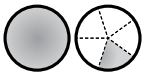
c  = 60 %

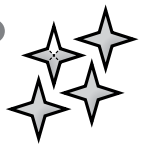
d  = 30 %

e  = $33.\dot{3}$ %

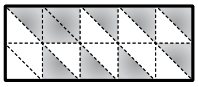
f  = 62.5 %

g  = 250 %

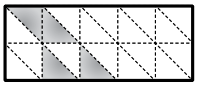
h  = 120 %

i  = 375 %

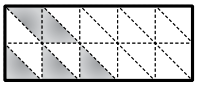
4 a 50%



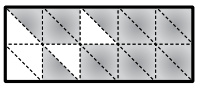
b 20%



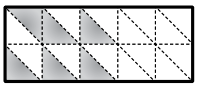
c 25%



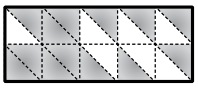
d 75%



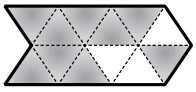
e 30%



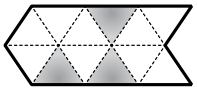
f 65%



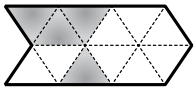
5 a 0.75



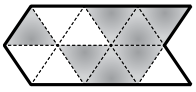
b 0.25



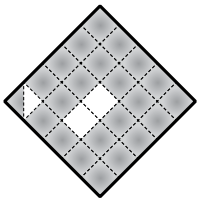
c $0.\dot{3}$



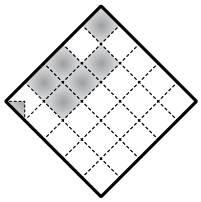
d $0.58\dot{3}$



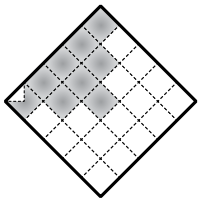
6 a 90%



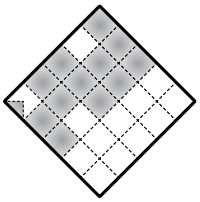
b 25%



c 35%



d 49%



Math Review Task
Grade 8

Mathletics

Percentage Calculations:

How does it work? | Solutions | Percentage Calculations

Percentage change

1 **a** 10% increase $= 100\% + 10\%$

$= 110\%$ of initial amount

$\therefore$ Increase of $10\% = 1.1 \times 25 = 27.5$

(1.1: Decimal form)

Other method:

Find 10% of 25 and add to 25

10% of $25 = 0.1 \times 25$

(0.1: Decimal form)

$= 2.5$

$\therefore$ Increase of $10\% = 2.5 + 25 = 27.5$

b 40% decrease $= 100\% - 40\%$

$= 60\%$ of initial amount

$\therefore$ Decrease of $40\% = 0.6 \times 65 = 39$

(0.6: Decimal form)

Other method:

Find 40% of 65 and subtract from 65

40% of $65 = 0.4 \times 65$

(0.4: Decimal form)

$= 26$

$\therefore$ Decrease of $40\% = 65 - 26 = 39$

2 **a** A decrease of $30\% = 100\% - 30\%$

$= 70\%$ of original amount

$\therefore 70\%$ of $50 = 0.70 \times 50$

$= 35$

b An increase of $25\% = 100\% + 25\%$

$= 125\%$ of original amount

$\therefore 125\%$ of $76 = 1.25 \times 76$

$= 95$

c An increase of $5\% = 100\% + 5\%$

$= 105\%$ of original amount

$\therefore 105\%$ of $6.2 = 1.05 \times 6.2$

$= 6.51$

Math Review Task
Grade 8

Mathletics

Percentage Calculations:

How does it work? | Solutions | Percentage Calculations

Percentage change

2 d A reduction of $1.5\% = 100\% - 1.5\%$

$= 98.5\%$ of original amount

$\therefore 98.5\% \text{ of } 8 = 0.985 \times 8$

$= 7.88$

e An increase of $33.\dot{3}\% = 100\% + 33.\dot{3}\%$

$= 133.\dot{3}\%$ of original amount

$\therefore 133.\dot{3}\% \text{ of } 258 = 1.\dot{3} \times 258$

$= 344$

f An increase of $92\% = 100\% + 92\%$

$= 192\%$ of original amount

$\therefore 192\% \text{ of } 12.8 = 1.92 \times 12.8$

$= 24.576$

3 a A decrease of $100\% = 100\% - 100\%$

$= 0\%$ of original amount

$\therefore 0\% \text{ of } 50 = 0.00 \times 50$

$= 0$ cars

b No, because a decrease of more than 100% gives you a negative number of cars. Negative amounts of a physical quantity means you finish with less than zero cars, which is not possible.

Math Review Task
Grade 8

Mathletics

Percentage Calculations:

How does it work? | Solutions | Percentage Calculations

Percentage change

4 a An increase of $100\% = 100\% + 100\%$

$= 200\%$ of original amount

$\therefore 200\% \text{ of } 70 = 2.00 \times 70$

$= 140$

b An increase of 100% is the same as doubling. So an equivalent mathematical calculation is 2×70.

c An increase of $200\% = 100\% + 200\%$

$= 300\%$ of original amount

$\therefore 300\% \text{ of } 70 = 3.00 \times 70$

$= 210$

d An increase of 200% is the same as tripling. So an equivalent mathematical calculation is 3×70.

e Let n be any positive counting number. An increase of $n \times 100\% = (n + 1) \times$ the original amount.

5 a An increase of $50\% = 100\% + 50\%$

$= 150\%$ of original amount

$\therefore 150\% \text{ of } \$20 = 1.50 \times \$20$

$= \$30$

b A decrease of $50\% = 100\% - 50\%$

$= 50\%$ of amount in part a

$\therefore 50\% \text{ of } \$30 = 0.50 \times \$30$

$= \$15$

c The increased amount is $\$30$ and the original amount is $\$20$, 50% of both values is different, so when decreasing the larger amount by a similar percentage, the actual amount it is reduced by is also larger.

Math Review Task
Grade 8

Mathletics

Percentage Calculations:

How does it work? | Solutions | Percentage Calculations

Percentage change

6 a An increase of $20\% = 100\% + 20\%$

$= 120\%$ of original amount

$\therefore 120\%$ of $80\text{m} = 1.20 \times 80\,\text{m}$

$= 96\,\text{m}$

A further increase of $25\% = 100\% + 25\%$

$= 125\%$ of new amount

$\therefore 125\%$ of $96\text{m} = 1.25 \times 96\,\text{m}$

$= 120\,\text{m}$

b No, because the whole 45% is calculated on the smaller initial value (increasing 80m by $45\% = 116\,\text{m}$). When split into two increases, the remaining 25% is calculated using a larger value, so therefore a larger increase.

Math Review Task
Grade 8

Mathletics

Probability:

How does it work? | Solutions | Probability

Theoretical probability

1 **a**

$S = \{1, 2, 3, 4, 5, 6, 7, 8\}$

$n(S) = n(Numbers) = 8$

b

$S = \{R, O, P, Y, G\}$

$n(S) = n(Colours) = 5$

c

$S = \{No, Yes, Maybe, Ask\ again\}$

$n(S) = n(Options) = 4$

2 **a** $n(E) = 2, \quad n(S) = 25$

$P(E) = \frac{2}{25} = 0.08$

b $n(White\ flowers) = 10, \quad n(Flowers) = 14$

$P(White\ flowers) = \frac{10}{14} = 0.71$ (to 2 d.p.)

c $n(Brown) = 7, \quad n(Cards) = 16$

$P(Brown\ card) = \frac{7}{16} = 0.44$ (to 2 d.p.)

d $n(Odd\ numbers) = 12, \quad n(Numbers) = 33$

$P(Odd\ numbers) = \frac{12}{33} = 0.36$ (to 2 d.p.)

3 **a** $n(E) = 1, \quad n(S) = 2$

$P(E) = \frac{1}{2} \times 100\% = 50\%$

b $n(E) = 3, \quad n(S) = 25$

$P(E) = \frac{3}{25} \times 100\% = 12\%$

c $n(E) = 36, \quad n(S) = 48$

$P(E) = \frac{36}{48} \times 100\% = 75\%$

d $n(E) = 5, \quad n(S) = 8$

$P(E) = \frac{5}{8} \times 100\% = 62\frac{1}{2}\%$

4 **a** $P(E) = \frac{1}{4}, \quad n(S) = 12$

$\therefore n(E) = \frac{1}{4} = \frac{n(E)}{12} \quad \therefore n(E) = 3$

b $P(E) = 30\% \left(\text{i.e. } \frac{3}{10}\right), \quad n(E) = 15$

$\therefore n(S) = \frac{3}{10} = \frac{15}{n(S)} \quad \therefore n(S) = 50$

c $P(Orange) = 0.6 \left(\text{i.e. } \frac{6}{10}\right), \quad n(Oranges) = 21$

$\therefore P(Orange) = \frac{3}{5} = \frac{21}{n(Fruit)}$

$\therefore n(Fruit) = 35$

d $n(Animals) = 12, \quad P(Duck) = 75\%$

$\therefore P(Duck) = \frac{3}{4} = \frac{n(Ducks)}{12}$

$\therefore n(Ducks) = 9$

Math Review Task
Grade 8

Mathletics

Probability:

How does it work? | Solutions | Probability

Independent and dependent events

1. Identify each of these as dependent or independent events by ticking the right term.

		Independent	Dependent
a	Flipping two coins	✓	
b	Flicking a number spinner and selecting a numbered card at random from a pack.	✓	
c	Selecting two blunt pencils from a pencil case at the same time.		✓
d	Picking two out of three cups (one after the other) to see which one contains a hidden ball.		✓
e	Selecting two green marbles if the first marble was returned to the bag before selecting the second one.	✓	
f	Guessing correctly the first two numbers to be drawn in a game of bingo.		✓
g	Randomly selecting seven tiles in a word game, then replacing and selecting another seven tiles.	✓	
h	Two different people opening their books to the exact same page as each other.	✓	
i	Two sheep giving birth to lambs on the same day.	✓	
j	Guessing who will finish in the first two places of a race.		✓

2. a Randomly selecting an even number from one bag and a green cube from the other.

   b Randomly selecting cubes with the same colour after replacing the first cube before selecting the second one.

   c Randomly selecting two cubes and them both being yellow coloured.

   d Randomly selecting two odd numbered cards from the bag without replacing the first card drawn.

Math Review Task
Grade 8

Probability:

How does it work? | Solutions | Probability

Two way tables

1 a

		Ice Cream	
		With	Without
Apple Pie	Hot	Hot, With ice cream	Hot, Without ice cream
	Cold	Cold, With ice cream	Cold, Without ice cream

b

		Direction	
		Clockwise	Counter Clockwise
Spinner	Yes	Yes, Clockwise	Yes, Counter clockwise
	No	No, Clockwise	No, Counter clockwise

c

		Shorts	
		Black	White
Shirt	Yellow	Yellow shirt, Black shorts	Yellow shirt, White shorts
	Red	Red shirt, Black shorts	Red shirt, White shorts
	Orange	Orange shirt, Black shorts	Orange shirt, White shorts

2 a How many people were surveyed? 54

b How many people surveyed play both instruments? 5

c How many people surveyed play the flute? 17

d How many people surveyed can play one instrument only? 26

e $n(Play\ guitar, Do\ not\ play\ flute) =$ 14

f Change the value 23 to 28 for two 'no' responses

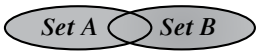
Math Review Task
Grade 8

Mathletics

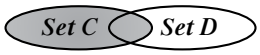
Probability:

How does it work? | Solutions | Probability

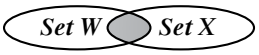
Set diagrams basics

1 **a** (i) 

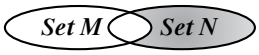
(ii) $A \cup B$

b (i) 

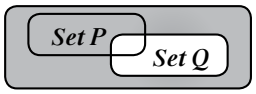
(ii) C

c (i) 

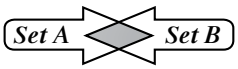
(ii) $W \cap X$

d (i) 

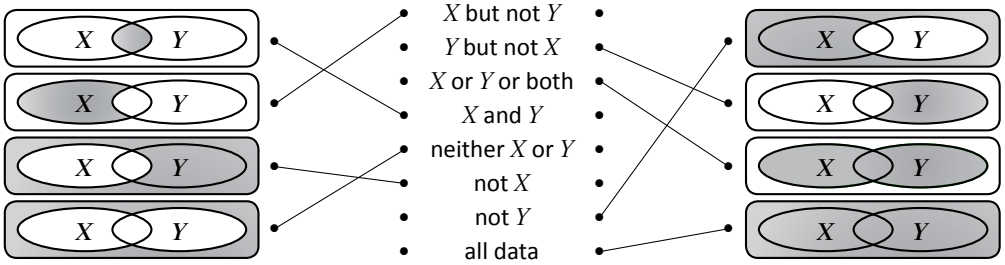
(ii) $N - M$

e (i) 

(ii) $\overline{Q}$

f (i) 

(ii) $A \cap B$

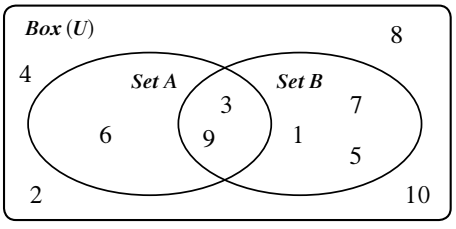
2 

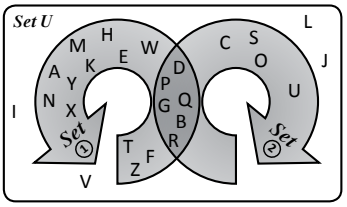
3 **a** (i) $A = \{3, 6, 9\}$

(ii) $B = \{1, 3, 5, 7, 9\}$

(iii) $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

(iv) $A \cap B = \{3, 9\}$

b 

4 

(i) ① $= \{A, B, D, E, F, G, H, K, M, N, P, Q, R, T, W, X, Y, Z\}$

(ii) ① $\cap$ ② $= \{B, D, G, P, Q, R\}$

(iii) $\overline{②} = \{A, E, F, H, I, J, K, L, M, N, T, V, W, X, Y, Z\}$

(iv) ② $-$ ① $= \{C, O, S, U\}$

(v) ① $-$ ② $= \{A, E, F, H, K, M, N, T, W, X, Y, Z\}$

Math Review Task
Grade 8

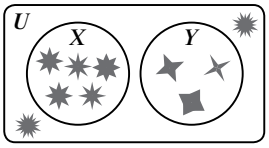
Mathletics

Probability:

How does it work? | Solutions | Probability

Probability and set diagrams

1 **a**



(i) Are outcomes from sets X and Y mutually exclusive? [X] Yes [ ] No

(ii) $n(X) =$ 5 (iii) $n(Y) =$ 3 (iv) $n(U) =$ 10

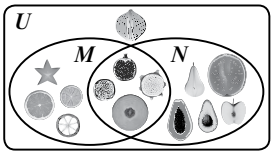
(v) $n(X \cap Y) =$ 0 (vi) $n(X \cup Y) =$ 8

(vii) $P(X \text{ or } Y) = P($ X $) + P($ Y $) - P($ X and Y $) = \frac{5}{10} + \frac{3}{10} - \frac{0}{10} = \frac{4}{5}$

(viii) Show that you get the same result for $P(X \text{ or } Y)$ using $\frac{n(X \cup Y)}{n(U)}$ from the Venn diagram.

$$P(X \text{ or } Y) = \frac{8}{10}$$

b



(i) Are outcomes from sets X and Y mutually exclusive? [ ] Yes [X] No

(ii) $n(M) =$ 8 (iii) $n(N) =$ 9 (iv) $n(U) =$ 14

(v) $n(M \cup N) =$ 13 (vi) $n(M \cap N) =$ 4

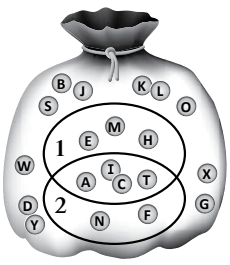
(vii) $P(X \cup Y) = P($ M $) + P($ N $) - P($ $M \cap N$ $) = \frac{8}{14} + \frac{9}{14} - \frac{4}{14} = \frac{13}{14}$

(viii) Show that you get the same result for $P(M \cup N)$ using $\frac{n(M \cup N)}{n(U)}$ from the Venn diagram.

$$P(M \cup N) = \frac{13}{14}$$

c (i) Are the outcomes from sets 1 and 2 in the Venn diagram below mutually exclusive? [ ] Yes [X] No

(ii) Use two different methods to calculate $P(1 \cup 2)$ when an object is selected at random from the bag.



Method 1: $n(1 \cup 2), \quad n(Bag) = 20$

$$P(1 \cup 2) = \frac{n(1 \cup 2)}{n(Bag)} = \frac{9}{20} = 45\%$$

Method 2: $n(1) = 7, \quad n(2) = 6, \quad n(1 \cap 2) = 4$

$$P(1 \cup 2) = P(1) + P(2) - P(1 \cap 2)$$

$$= \frac{7}{20} + \frac{6}{20} - \frac{4}{20}$$

$$= \frac{9}{10} = 45\%$$

Math Review Task
Grade 8

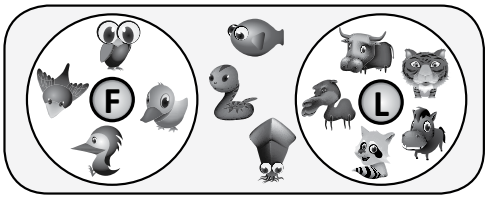
Mathletics

Probability:

How does it work? | Solutions | Probability

Probability and set diagrams

2 **a**



(i) $n(F) =$ 4

(ii) $n(L) =$ 5

(iii) $n(U) =$ 12 (The number of animals)

b There are no four-legged flying animals/ There are no four-legged animals that can fly in the sanctuary.

c $P(F) = \dfrac{n(F)}{n(U)} \times 100\%$

$= \dfrac{4}{12} \times 100\%$

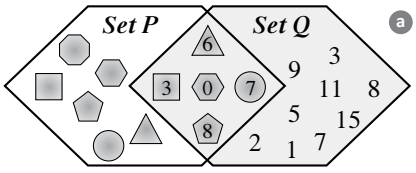
$= 33\dfrac{1}{3}\%$

d $P(\overline{F \text{ or } L}) = \dfrac{n(\overline{F \text{ or } L})}{n(U)}$

$= \dfrac{3}{12}$

$= \dfrac{1}{4}$ or 25%

3



a (i) $n(P) =$ 11 (ii) $n(Q) =$ 14

(iii) $n(P \text{ and } Q) =$ 5 (iv) $n(P \text{ or } Q) =$ 20

b $\therefore P(P \text{ or } Q) = P(P) + P(Q) - P(P \text{ and } Q)$ or $P(P \text{ or } Q) = \dfrac{n(P \cup Q)}{n(U)}$

c $\therefore P(P \text{ or } Q) = P(P) + P(Q) - P(P \text{ and } Q)$

$= \dfrac{11}{20} + \dfrac{14}{20} - \dfrac{5}{20}$

$= 1 = 100\%$

e All the elements in the box are in either set P or set Q, so the probability of selecting something from either of these sets is a certainty.

d The probability of selecting a shape that has a number written on it.

Math Review Task
Grade 8

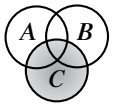
Mathletics

Probability:

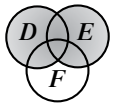
How does it work? | Solutions | Probability

More Venn diagrams

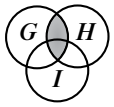
1 **a** C



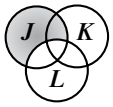
b $D \cup E$



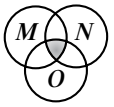
c $G \cap H$



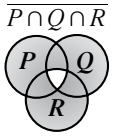
d $J - L$



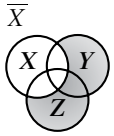
e $M \cap N \cap O$



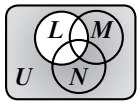
f $\overline{P \cap Q \cap R}$



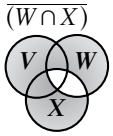
g $\overline{X}$



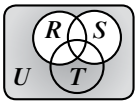
h $\overline{L}$



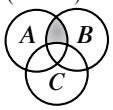
i $\overline{(W \cap X)}$



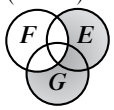
j $\overline{(R \cup S)}$



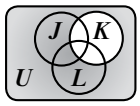
k $(A \cap B) - C$



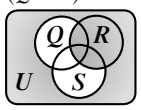
l $(E \cup G) - F$



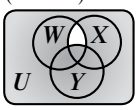
m $\overline{K - J}$



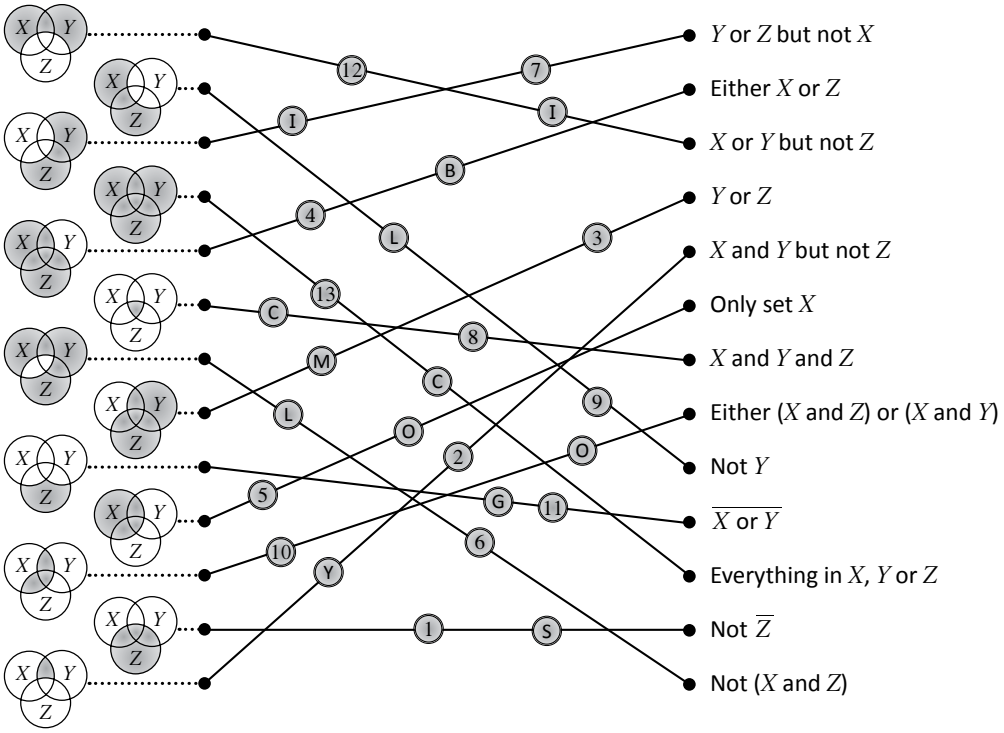
n $\overline{(Q \cup S) - R}$



o $\overline{(W \cap X) - Y}$



2



S	Y	M	B	O	L	I	C		L	O	G	I	C
1	2	3	4	5	6	7	8		9	10	11	12	13