Math Review Task
Grade 8

Mathletics

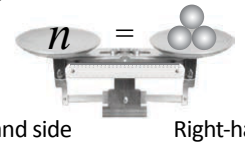
Equations:

How does it work? | Your Turn | Equations

Keeping things in balance

1 These scales are all in balance. Write the equation each one represents.

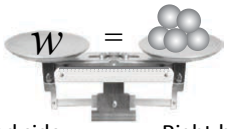
a ● = +1



Left-hand side | Right-hand side

Equation:

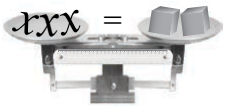
b ● = +1



Left-hand side | Right-hand side

Equation:

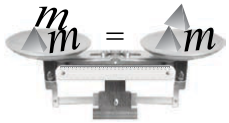
c ■ = +1



Left-hand side | Right-hand side

Equation:

d ▲ = +1



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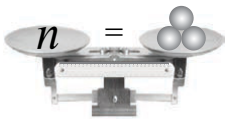
Equation:

2 Using the same balanced scales from question 1, write the new equation if these changes were made:

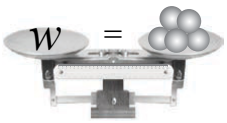
a ● = +1 One circle added to both sides



Left-hand side | Right-hand side

New equation:

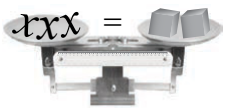
b ● = +1 Three circles added to both sides



Left-hand side | Right-hand side

New equation:

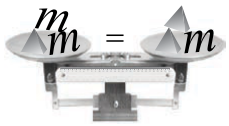
c ■ = +1 One x added to both sides



Left-hand side | Right-hand side

New equation:

d ▲ = +1 Multiply both sides by 2



Left-hand side | Right-hand side

New equation:

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Mathletics

Equations:

How does it work? | Your Turn | Equations

Solving simple equations

1. Solve these equations mentally.

a. $s + 5 = 15$ $\therefore s =$ ☐

b. $t - 5 = 24$ $\therefore t =$ ☐

c. $a \div 6 = 6$ $\therefore a =$ ☐

d. $11 - r = 2$ $\therefore r =$ ☐

e. $p + 6 = 35$ $\therefore p =$ ☐

f. $18 \times o = 18$ $\therefore o =$ ☐

g. $42 \div i = 7$ $\therefore i =$ ☐

h. $16 + n = 52$ $\therefore n =$ ☐

i. $44 \div t = 4$ $\therefore t =$ ☐

j. $2.5 \times s = 25$ $\therefore s =$ ☐

Join the dots with the answers **in the same order as the questions** to see what shape the variables form.

2 5 13 10 3 23 18
14 31 22 8 42 17 34 31
1 25 26 4 41 15 6
34 45 29 7 43 35 41 16
47 40 52 36 30 27 32
19 24 39 28 56 45 38 20
9 52 12 33 37 43 11

2. Use opposite operations to solve these one step equations.

a. $x + 7 = 16$ $\therefore x =$ ☐

b. $y + 15 = 13$ $\therefore y =$ ☐

c. $m - 3 = 8$ $\therefore m =$ ☐

d. $a - 12 = 5$ $\therefore a =$ ☐

e. $3k = 27$ $\therefore k =$ ☐

f. $14w = 42$ $\therefore w =$ ☐

g. $q \div 4 = 24$ $\therefore q =$ ☐

h. $z \div (-2) = 8$ $\therefore z =$ ☐

i. $b - 13 = -7$ $\therefore b =$ ☐

j. $15 + g = -4$ $\therefore g =$ ☐

k. $-2r = -13$ $\therefore r =$ ☐

l. $48 \div p = 3$ $\therefore p =$ ☐

Math Review Task
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Mathletics

Equations:

Where does it work? | Your Turn | Equations

Two-step equations

1. Use inverse operations to solve these two-step equations.

a $3x + 5 = 14$

$3x + 5 - 5 = 14 - 5$

$3x = \square$

$3x \div \square = \square \div \square$

$x = \square$

b $6g - 1 = 27$

$6g - 1 + 1 = 27 + 1$

$6g = \square$

$6g \div \square = \square \div \square$

$g = \square$

c $4a + 11 = 39$

$\therefore a = \square$

d $5w - 12 = 18$

$\therefore w = \square$

e $2b + 12 = 8$

$\therefore b = \square$

f $3n - 5 = -8$

$\therefore n = \square$

g $10 - 2m = 18$

$10 - 2m - 10 = 18 - 10$

$-2m = \square$

$-2m \div \square = \square \div \square$

$m = \square$

h $25 - 6p = -29$

$\therefore p = \square$

i $3 - g = 8$

$\therefore g = \square$

j $15 - y = 16$

$\therefore y = \square$

k $9 - q = 4$

$\therefore q = \square$

l $25 = 13 - n$

$\therefore n = \square$

Math Review Task
Grade 8

Mathletics

Equations:

Where does it work? | Your Turn | Equations

Equations with fractions

Solve each of the equations below containing fractions.

1 a $\frac{3v}{4} = 6$

$\frac{3v}{4} \times 4 = 6 \times 4$

$3v = \square$

$3v \div \square = \square \div \square$

$\therefore v = \square$

b $\frac{7t}{3} = 21$

$\therefore t = \square$

c $\frac{3u}{2} = -12$

$\therefore u = \square$

d $\frac{-6h}{5} = 4$

$\therefore h = \square$

2 a $\frac{x+4}{3} = 6$

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

$x + 4 = \square$

$x + 4 \square = \square - \square$

$\therefore x = \square$

b $\frac{y-12}{4} = 2$

$\therefore y = \square$

c $\frac{d-16}{2} = -9\frac{1}{2}$

$\therefore d = \square$

d $-5 = \frac{8+a}{2}$

$\therefore a = \square$

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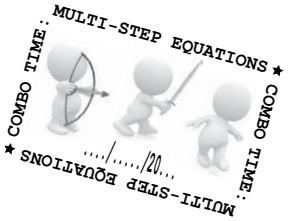
Mathletics

Equations:

Where does it work?	Your Turn	Equations

Combo time: Multi-step equations



Use opposite operations to solve these multi-step equations.

1. $\frac{2x-5}{3} = -9$

$\therefore x =$ ⋯⋯

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

$\therefore y =$ ⋯⋯

3. $\frac{5b+1}{7} = \frac{2b}{3}$

$\therefore b =$ ⋯⋯

4. $\frac{3a-2}{5} = \frac{4a}{6}$

$\therefore a =$ ⋯⋯

Math Review Task
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Mathletics

Equations:

Where does it work? | Your Turn | Equations

Combo time: Multi-step equations

5 $\frac{15h}{4} = \frac{14h+11}{3}$

$\therefore h =$ ⬚

6 $3(2+q) = 6(4+q)$

$\therefore q =$ ⬚

7 $3(4n+1) = 5(4-n)$

$\therefore n =$ ⬚

8 $-8(k-2) = 6(k+2)$

$\therefore k =$ ⬚

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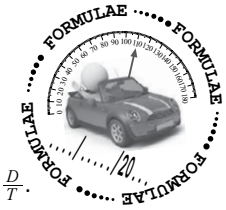
Mathletics

Equations:

What else can you do? | Your Turn | Equations

Formulae



1. Calculate the value of these formulas using the given values for each variable.

   a. The speed (S) of an object in kilometers per hour is given by the formula $S = \frac{D}{T}$. D is the distance in kilometers and T the time taken in hours. Calculate S when:

   (i) $D = 140$ km and $T = 2$ hours

   ∴ The speed $S =$ ⬚ km/h

   (ii) $D = 31.5$ km and $T = 0.5$ hours

   ∴ The speed $S =$ ⬚ km/h

   b. To convert the temperature from degrees Celcius (C) to degrees Fahrenheit (F) the formula is: $F = \frac{9C + 160}{5}$. Calculate F when:

   (i) $C = 32^{\circ}$

   ∴ The converted temperature $=$ ⬚ $^{\circ}F$

   (ii) $C = 0^{\circ}$

   ∴ The converted temperature $=$ ⬚ $^{\circ}F$

2. Substitute the given values into these formulae and solve the equation for the unknown variable.

   a. The area of a rectangle is calculated using the formula $A=lb$ where l and b are the length and breadth. Calculate the length l of the following rectangles with these breadths and areas:

   (i) $A = 36$ cm^2 and $b = 4$ cm

   ∴ The length l of the rectangle $=$ ⬚ cm

   (ii) $A = 25.48$ cm^2 and $b = 2.6$ cm

   ∴ The length l of the rectangle $=$ ⬚ cm

   b. The average of two numbers ($\overline{x}$) is calculated by the formula $\overline{x} = \frac{(a+b)}{2}$, where a and b are the two numbers. Calculate the number a for following average values $\overline{x}$ and given number b.

   (i) $\overline{x} = 21$ and $b = 28$

   ∴ The number $a =$ ⬚

   (ii) $\overline{x} = 4.75$ and $b = 3.6$

   ∴ The number $a =$ ⬚

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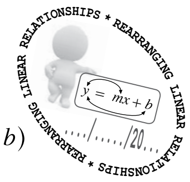
Grade 8

Linear Relationships:

Rearranging linear relationships



1 (i) Rearrange each of these linear relationships into gradient-intercept form ($y = mx + b$)
(ii) Write the gradient and y-intercept for each of these linear equations

a $4y = 8x - 12$

(i)

(ii) Gradient (m) =

y-intercept (b) =

b $2y = 14x + 6$

(i)

(ii) Gradient (m) =

y-intercept (b) =

c $10y - 10x = 25$

(i)

(ii) Gradient (m) =

y-intercept (b) =

d $4y + 3x = 12$

(i)

(ii) Gradient (m) =

y-intercept (b) =

e $6x + 2y = 1$

(i)

(ii) Gradient (m) =

y-intercept (b) =

f $8x - 4y = 16$

hint: be careful with negative values here

(i)

(ii) Gradient (m) =

y-intercept (b) =

Math Review Task
Grade 8

Mathletics

Linear Relationships:

How does it work? | Your Turn | Linear Relationships

Rearranging linear relationships

2 (i) Rearrange each of these linear relationships into gradient-intercept form ($y = mx + b$)
(ii) Write the gradient and y-intercept for each of these linear equations

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

(i)

(ii) Gradient (m) = ☐

y-intercept (b) = ☐

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

(i)

(ii) Gradient (m) = ☐

y-intercept (b) = ☐

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

(i)

(ii) Gradient (m) = ☐

y-intercept (b) = ☐

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

(i)

(ii) Gradient (m) = ☐

y-intercept (b) = ☐

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

(i)

(ii) Gradient (m) = ☐

y-intercept (b) = ☐

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

hint: be careful with the sign of the gradient

(i)

(ii) Gradient (m) = ☐

y-intercept (b) = ☐

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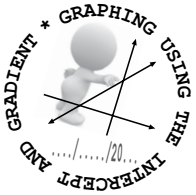
Grade 8

Mathletics

Linear Relationships:

How does it work? | Your Turn | Linear Relationships

Graphing using the intercept and gradient

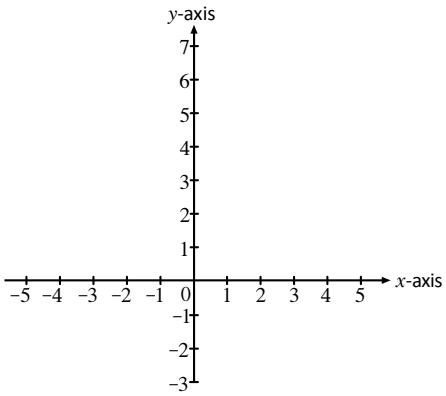


1 Sketch each of these linear equations using the y-intercept and gradient

a $y = 2x + 3$

Gradient (m) =

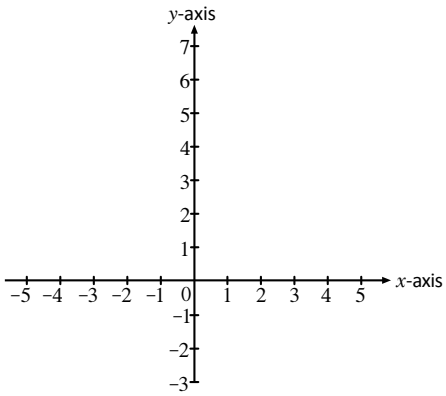
y-intercept (b) =



b $y = -3x + 1$

Gradient (m) =

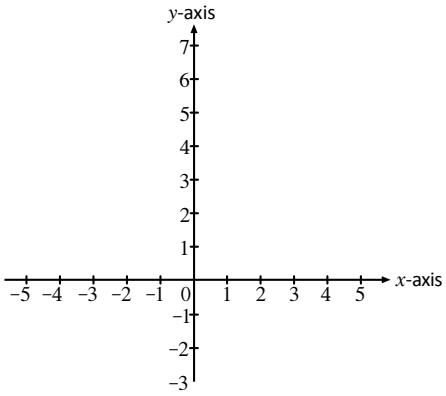
y-intercept (b) =



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

Gradient (m) =

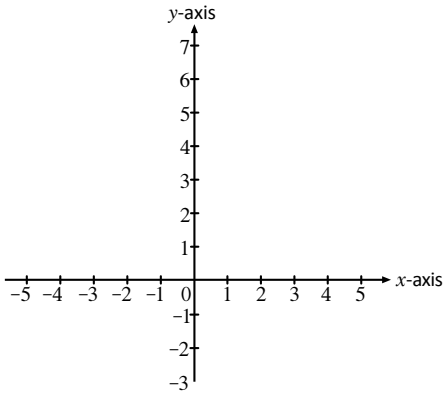
y-intercept (b) =



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

Gradient (m) =

y-intercept (b) =



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Mathletics

Linear Relationships:

How does it work? | Your Turn | Linear Relationships

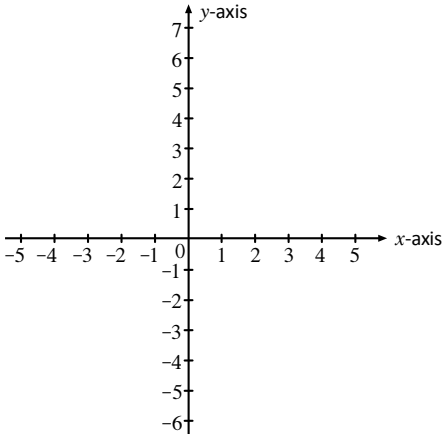
Graphing using the intercept and gradient

2 Sketch each of these linear equations using the y-intercept and gradient

a $y = -2x - 4$

Gradient (m) =

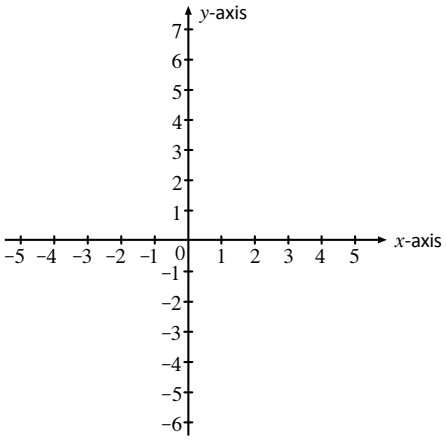
y-intercept (b) =



b $y = -x - 5$

Gradient (m) =

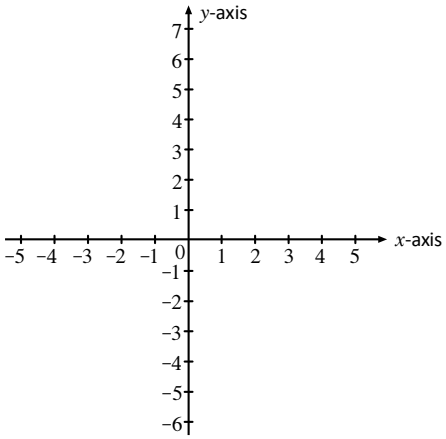
y-intercept (b) =



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

Gradient (m) =

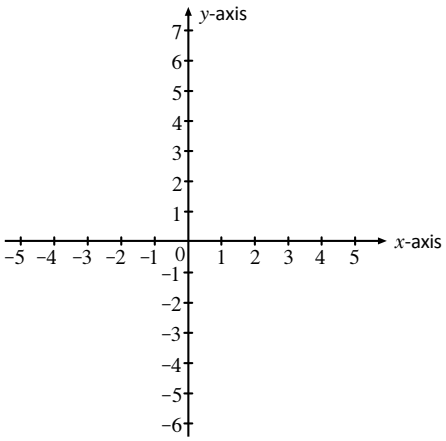
y-intercept (b) =



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

Gradient (m) =

y-intercept (b) =



Math Review Task
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Mathletics

Linear Relationships:

Where does it work? | Your Turn | Linear Relationships

Comparing graphs

1. Compare the gradients for each of the following pairs of linear equations and tick whether they are **parallel** or **not parallel**.

Remember:
Parallel lines have the same gradient

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 ☐

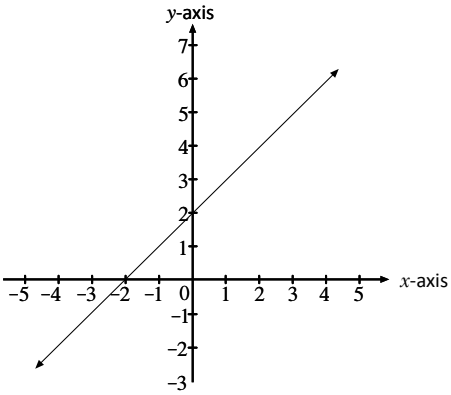
d. $y - 2x = 2$ and $y = 2 - 2x$

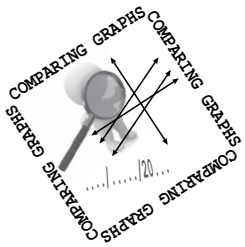
Parallel ☐ Not Parallel ☐

2. In each of these, one linear equation has already been graphed but not labelled.
Compare the gradient of the graphed equation with the un-graphed equation.
Tick whether they would be **parallel** or **not parallel** when graphed on the same set of axes.
psst!: You can graph the other equation if it helps!

a. $y = x + 4$

Parallel ☐ Not Parallel ☐





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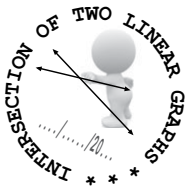
Linear Relationships:

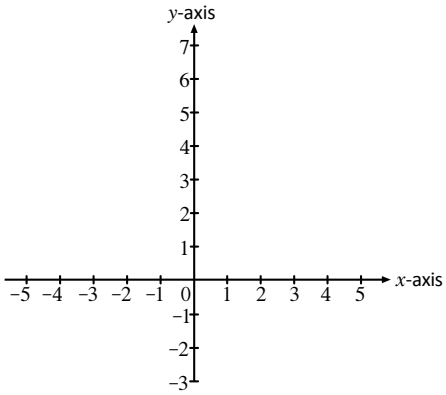
What else can you do? | Your Turn | Linear Relationships

Intersection of two linear graphs



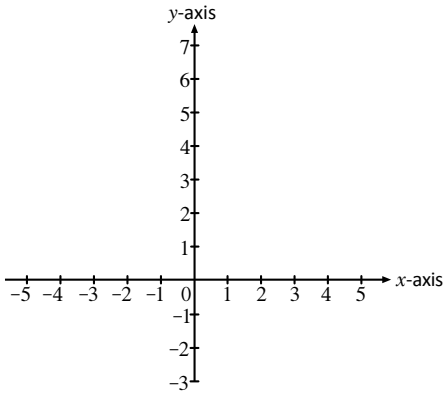
1 (i) Graph each pair of equations below on the same number plane
(ii) Write the coordinates of their point of intersection

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



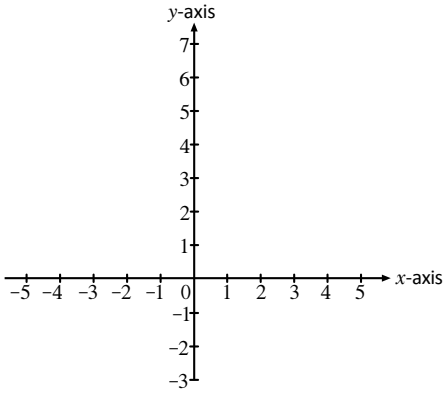
Point of intersection: (,)

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



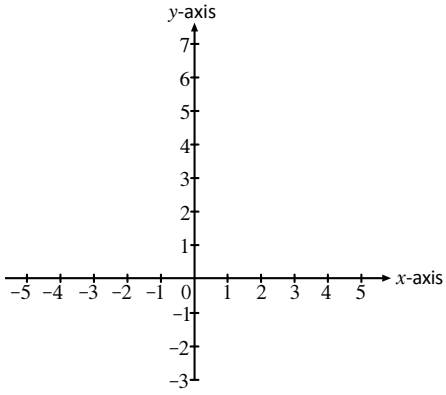
Point of intersection: (,)

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



Point of intersection: (,)

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



Point of intersection: (,)

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Grade 8

Mathletics

Percentage Calculations:

How does it work? | Your Turn | Percentage Calculations

Fractions and percentages

1. Write these fractions as a percentage.

   a. $\frac{3}{100} = \square\,\%$ b. $\frac{41}{100} = \square\,\%$ c. $\frac{110}{100} = \square\,\%$ d. $\frac{200}{100} = \square\,\%$

2. Write these percentages as a fraction.

   a. $7\% = \frac{\square}{\square}$ b. $89\% = \frac{\square}{\square}$ c. $117\% = \frac{\square}{\square}$ d. $336\% = \frac{\square}{\square}$

3. Write these percentages as a fraction with 100 in the denominator and then simplify.

   a. $20\% = \frac{\square}{100} = \frac{\square}{\square}$ Simplified b. $15\% = \frac{\square}{100} = \frac{\square}{\square}$ Simplified c. $80\% = \frac{\square}{100} = \frac{\square}{\square}$ Simplified

   d. $24\% = \frac{\square}{\square} = \frac{\square}{\square}$ Simplified e. $42\% = \frac{\square}{\square} = \frac{\square}{\square}$ Simplified f. $96\% = \frac{\square}{\square} = \frac{\square}{\square}$ Simplified

   g. $125\% = \frac{\square}{\square} = \frac{\square}{\square}$ Simplified improper h. $180\% = \frac{\square}{\square} = \frac{\square}{\square}$ Simplified improper i. $350\% = \frac{\square}{\square} = \frac{\square}{\square}$ Simplified improper

4. Write these as equivalent fractions with a denominator of 100 and then as a percentage.

   a. $\frac{24}{300} = \frac{24 \div \square}{300 \div \square} = \frac{\square}{100} = \square\,\%$

   b. $\frac{48}{200} = \frac{48 \div \square}{200 \div \square} = \frac{\square}{\square} = \square\,\%$

   c. $\frac{175}{500} = \frac{175 \div \square}{500 \div \square} = \frac{\square}{\square} = \square\,\%$

Math Review Task
Grade 8

Mathletics

Percentage Calculations:

How does it work? | Your Turn | Percentage Calculations

Decimals and percentages

1. Write these percentages as a decimal.

   a. $15\% =$ ☐ b. $20\% =$ ☐ c. $4\% =$ ☐ d. $9\% =$ ☐

   e. $125\% =$ 1.25 f. $250\% =$ ☐ g. $110\% =$ ☐ h. $305\% =$ ☐

2. Write these decimals as percentages.

   a. $0.03 =$ ☐ % b. $0.16 =$ ☐ % c. $1.12 =$ ☐ % d. $2.45 =$ ☐ %

   e. $0.125 =$ ☐ % f. $0.253 =$ ☐ % g. $0.018 =$ ☐ % h. $0.2225 =$ ☐ %

3. Write these decimals as decimal percentages and either mixed number or improper fractions.

   a. $0.015 =$ ☐ % (Decimal) $= \frac{\square}{\square}\%$ (Improper fraction)

   b. $0.185 =$ ☐ % (Decimal) $= \square\frac{\square}{\square}\%$ (Mixed number)

   c. $0.012 =$ ☐ % (Decimal) $= \frac{\square}{\square}\%$ (Improper fraction)

   d. $0.458 =$ ☐ % (Decimal) $= \square\frac{\square}{\square}\%$ (Mixed number)

4. Write these percentages as decimals, mixed numbers and improper fractions.

   a. $155\% =$ ☐ (Decimal) $= \square\frac{\square}{\square}$ (Mixed number) $= \frac{\square}{\square}$ (Improper fraction)

   b. $218\% =$ ☐ (Decimal) $= \square\frac{\square}{\square}$ (Mixed number) $= \frac{\square}{\square}$ (Improper fraction)

   c. $100.5\% =$ ☐ (Decimal) $= \square\frac{\square}{\square}$ (Mixed number) $= \frac{\square}{\square}$ (Improper fraction)

   d. $220.4\% =$ ☐ (Decimal) $= \square\frac{\square}{\square}$ (Mixed number) $= \frac{\square}{\square}$ (Improper fraction)

   e. $375.20\% =$ ☐ (Decimal) $= \square\frac{\square}{\square}$ (Mixed number) $= \frac{\square}{\square}$ (Improper fraction)

   f. $125.8\% =$ ☐ (Decimal) $= \square\frac{\square}{\square}$ (Mixed number) $= \frac{\square}{\square}$ (Improper fraction)

Math Review Task
Grade 8

Mathletics

Percentage Calculations:

Where does it work? | Your Turn | Percentage Calculations

Percentage of an amount

1. Complete the steps for these percentage calculations:

a. 15% of 40 $= \frac{\square}{\square} \times \square$

$= \square$

b. 28% of 75 $= \frac{\square}{\square} \square 75$

$= \square$

c. 65% of 60 $= \{\square \times \square\} \times 60$

$= \square \times 60$

$= \square$

d. 22.5% of 280 $= \{22.5 \square 100\} \square \square$

$= \square \times \square$

$= \square$

2. Calculate these percentage amounts showing all working.

a. 20% of 65

b. 60% of 35

c. 22% of 25

d. 15% of 30

e. 67.5% of 48

f. $34\frac{1}{2}$% of 14

These ones will result in answers larger than the original amount.

g. 125% of 12

h. 220% of 40

i. 150% of 15

j. 175% of 79

Math Review Task
Grade 8

Mathletics

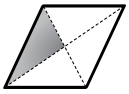
Percentage Calculations:

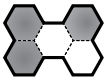
Where does it work? | Your Turn | Percentage Calculations

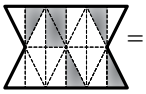
Percentage of an amount

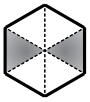
3 What percentage of these shapes has been shaded?

a  = ____ %

b  = ____ %

c  = ____ %

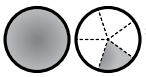
d  = ____ %

e  = ____ %

f  = ____ %

Hint: the next three have more than one whole shape in them (so $> 100\%$).

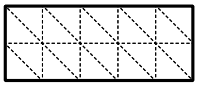
g  = ____ %

h  = ____ %

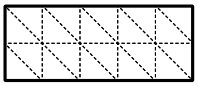
i  = ____ %

4 Shade these shapes made using 20 identical triangles to match the given percentage values.

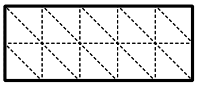
a 50%



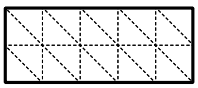
b 20%



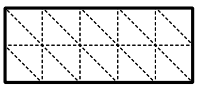
c 25%



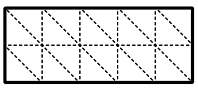
d 75%



e 30%

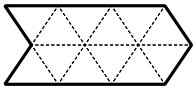


f 65%

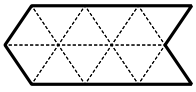


5 Shade the percentage of these shapes that match the given decimal values.

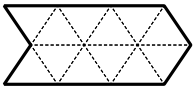
a 0.75



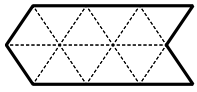
b 0.25



c $0.\dot{3}$

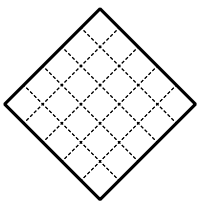


d $0.58\dot{3}$

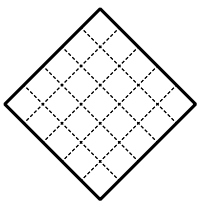


6 Shade the percentage of these shapes that match the given values.
Some shapes will need to be divided up into smaller parts to shade correctly.

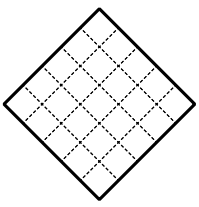
a 90%



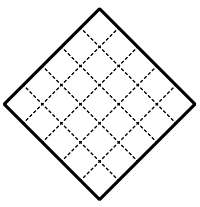
b 25%



c 35%



d 49%



Math Review Task
Grade 8

Mathletics

Percentage Calculations:

What else can you do? | Your Turn | Percentage Calculations

Percentage change

1. Complete these calculations to see the two different ways you can calculate percentage changes.

   a. Increase 25 by 10%

   10% increase = 100% ☐ 10%

   = ☐ % of initial amount

   ∴ Increase of 10% = ☐ (Decimal form) × 25 = ☐

   Other method:

   Find 10% of 25 and add to 25

   10% of 25 = ☐ (Decimal form) × 25

   = ☐

   ∴ Increase of 10% = ☐ + 25 = ☐

   b. Decrease 65 by 40%

   40% decrease = 100% ☐ 40%

   = ☐ % of initial amount

   ∴ Decrease of 40% = ☐ (Decimal form) × 65 = ☐

   Other method:

   Find 40% of 65 and subtract from 65

   40% of 65 = ☐ (Decimal form) × 65

   = ☐

   ∴ Decrease of 40% = 65 − ☐ = ☐

2. Calculate these percentage changes:

   a. Decrease 50 by 30%.

   b. Increase 76 by 25%.

   c. Increase 6.2 by 5%.

   d. Reduce 8 by 1.5%.

   e. Mark 258 larger by $33\frac{1}{3}\%$.

   f. Add a further 92% to $12\frac{4}{5}\%$.

3. a. Decrease 50 cars by 100%.

   b. Can you decrease a physical quantity (such as cars) by more than 100%? Briefly explain your answer.

Math Review Task
Grade 8

Mathletics

Percentage Calculations:

What else can you do? | Your Turn | Percentage Calculations

Percentage change

4 a Increase 70 by 100%

b Write down another mathematical calculation which also increases a number by 100%.

c Increase 70 by 200%.

d Write down another mathematical calculation which also increases a number by 200%

e Write down a general rule you could use to make increasing a number by a multiple of 100% quick and simple.

5 a Increase $20 by 50%.

b Reduce the answer to part a by 50%.

c Did you expect to get the same amount of $20 for part b because you were increasing and decreasing by the same percentage?
Explain briefly why you think the answer to part b could not be $20.

6 a Lengthen 80 m by 20%, then increase this length by a further 25%.

b Is increasing a number by 20% and then increasing the answer by 25% the same as increasing the original amount by 45%? Briefly explain why/why not.

Math Review Task
Grade 8

Mathletics

Probability:

How does it work? | Your Turn | Probability

Theoretical probability

1. Write down the sample space S and calculate $n(S)$ for each of these spinners:

a 

$S =$ ⬚

$n(S) = n(Numbers) =$ ⬚

b 

$S =$ ⬚

$n(S) = n(Colors) =$ ⬚

c 

$S =$ ⬚

$n(S) = n(Options) =$ ⬚

2. Calculate $P(E)$ accurate to 2 decimal places for these favorable outcomes and sample set values.

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

$P(E) =$

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

$P(White\ flowers) =$

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

$P(Brown\ card) =$

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

$P(Odd\ numbers) =$

3. Calculate $P(E)$, as a percentage of these:

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

$P(E) =$

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

$P(E) =$

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

$P(E) =$

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

$P(E) =$

4. Calculate $n(E)$ or $n(S)$ for each of these:

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

$\therefore n(E) =$

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

$\therefore n(S) =$

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

$\therefore n(Fruit) =$

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

$\therefore n(Ducks) =$

Math Review Task
Grade 8

Mathletics

Probability:

How does it work? | Your Turn | Probability

Independent and dependent events

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

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

2. Bag 1 contains ten cards and each card has a different number (from 0 through to 9) written on it.
Bag 2 contains five yellow cubes and five green cubes.
Describe two independent events and two dependent events that can be explored through random selections from one or both of these bags.

a. Independent events 1:

b. Independent events 2:

c. Dependent events 1:

d. Dependent events 2:

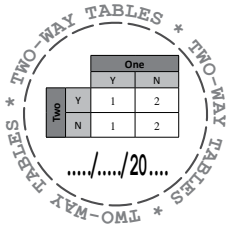
Math Review Task
Grade 8

Mathletics

Probability:

Where does it work? | Your Turn | Probability

Two-way tables



1. Complete the two-way tables for each of these:

   a. People were asked if they preferred their apple pie hot/cold and with/without ice cream.

		Ice Cream	
Apple pie			

   b. A decision spinner (Yes/No) spun either clockwise or counter-clockwise.

		Direction	

   c. A new local sports team asked its players for their preferred choice of team colours between black/white shorts and yellow, red or orange shirts.

2. Answer the questions for the two-way table below showing the results of a musical survey.

		Play guitar	
		Yes	No
Play flute	Yes	5	12
	No	14	23

   a. How many people were surveyed?

   b. How many people surveyed play both instruments?

   c. How many people surveyed play the flute?

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

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

   f. Another 5 people who do not play either instrument are surveyed. What change needs to be made to the table?

Math Review Task
Grade 8

Mathletics

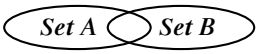
Probability:

Where does it work?	Your Turn	Probability

Set diagram basics

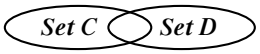
1. (i) Shade each of these diagrams to match the statements given.
   (ii) Write the shaded area using the symbols $\cap$, $\cup$, $-$ or $\overline{Set}$.

   a. (i) All the data in both sets

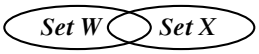
   (ii) ⋯⋯⋯⋯⋯⋯

   b. (i) All members in Set C

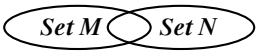
   (ii) ⋯⋯⋯⋯⋯⋯

   c. (i) Data is shared by both sets

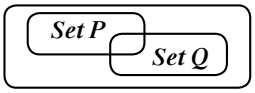
   (ii) ⋯⋯⋯⋯⋯⋯

   d. (i) Set N but not Set M

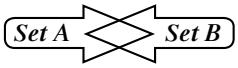
   (ii) ⋯⋯⋯⋯⋯⋯

   e. (i) Everything except Set Q

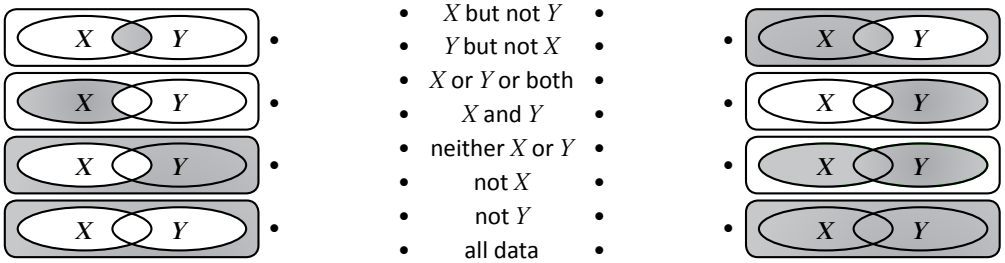
   (ii) ⋯⋯⋯⋯⋯⋯

   f. (i) The members of Set B that are not unique to Set B

   (ii) ⋯⋯⋯⋯⋯⋯

2. Match these Venn diagrams with the correct description in the middle.



- X but not Y
- Y but not X
- X or Y or both
- X and Y
- neither X or Y
- not X
- not Y
- all data

3. A box contains ten balls, all numbered from 1 to 10.

   Set A = balls containing multiples of 3, Set B = balls containing odd numbers.

   a. Write in the members of each set below:

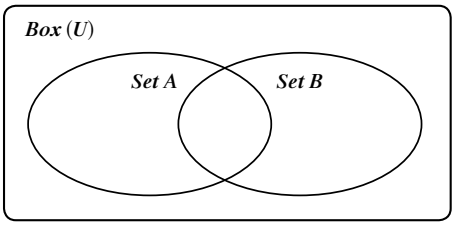
   (i) $A = \{3, 6, 9\}$

   (ii) $B = \{\quad\}$

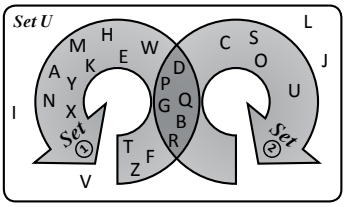
   (iii) $U = \{\quad\}$

   (iv) $A \cap B = \{\quad\}$

   b. Put the data into this Venn diagram.



4. Write down the members of the following sets displayed in the Venn diagram below:



(i) ① =

(ii) ① ∩ ② =

(iii) $\overline{②}$ =

(iv) ② − ① =

(v) ① − ② =

Math Review Task
Grade 8

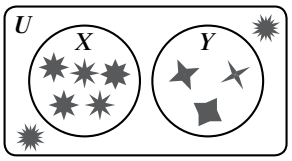
Mathletics

Probability:

Where does it work?	Your Turn	Probability

Probability and set diagrams

1 Fill in the missing values and complete the probability calculations for these set diagrams:

a 

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

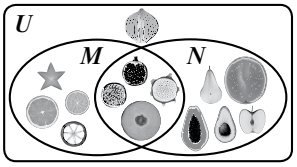
(ii) $n(X) =$ ☐ (iii) $n(Y) =$ ☐ (iv) $n(U) =$ ☐

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

(vii) $P(X \text{ or } Y) = P($☐$) + P($☐$) - P($☐$) =$ ☐ $+$ ☐ $-$ ☐ $=$ ☐

(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.

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

b 

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

(ii) $n(M) =$ ☐ (iii) $n(N) =$ ☐ (iv) $n(U) =$ ☐

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

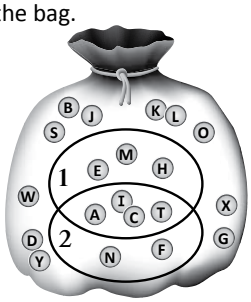
(vii) $P(X \cup Y) = P($☐$) + P($☐$) - P($☐$) =$ ☐ $+$ ☐ $-$ ☐ $=$ ☐

(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.

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

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

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



Method 1:

Method 2:

Math Review Task
Grade 8

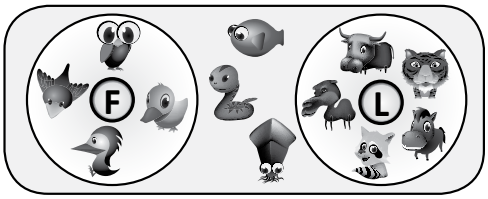
Mathletics

Probability:

Where does it work? | Your Turn | Probability

Probability and set diagrams

2 Some animals in a small sanctuary were sorted by: (F) Animals that can fly, (L) Animals with exactly four legs.

a 

(i) $n(F) =$ ⬚

(ii) $n(L) =$ ⬚

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

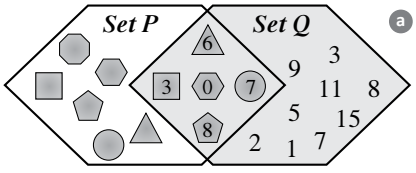
b Briefly explain why the two categories (F) and (L) do not overlap in the diagram.

c If an animal was selected at random, what is the probability it could fly as a percentage?

d There are three animals in neither category. Use this to calculate $P(\overline{F \text{ or } L})$.

Remember: The bar over the top means the complement.

3 The Venn diagram below shows all the elements in a box containing a mixture of shapes, numbers and shapes with numbers on them only.



a Write down the number of members in each of these sets:

(i) $n(P) =$ ⬚ (ii) $n(Q) =$ ⬚

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

b Write a rule you need to use to calculate $P(P \text{ or } Q)$.

c One of the elements were selected randomly from the box. Calculate $P(P \text{ or } Q)$.

e Briefly explain why the probability of selecting a shape (Set P) or a number (Set Q) equals 1.

d What probability would the calculation $\frac{n(P \cap Q)}{n(P \cup Q)} \times 100\%$ be finding?

Math Review Task
Grade 8

Mathletics

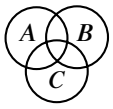
Probability:

What else can you do? | Your Turn | Probability

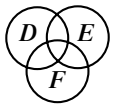
More Venn diagrams

1. Shade the areas on these Venn diagrams that match the given set notations.

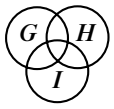
a. C



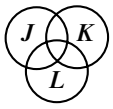
b. $D \cup E$



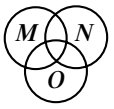
c. $G \cap H$



d. $J - L$

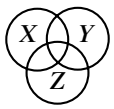


e. $M \cap N \cap O$

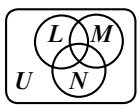


f. $\overline{P \cap Q \cap R}$

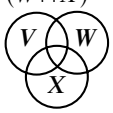
g. $\overline{X}$



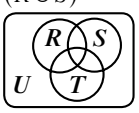
h. $\overline{L}$



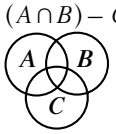
i. $\overline{(W \cap X)}$



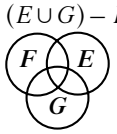
j. $\overline{(R \cup S)}$



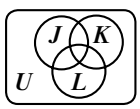
k. $(A \cap B) - C$



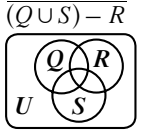
l. $(E \cup G) - F$



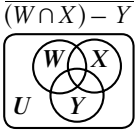
m. $\overline{K - J}$



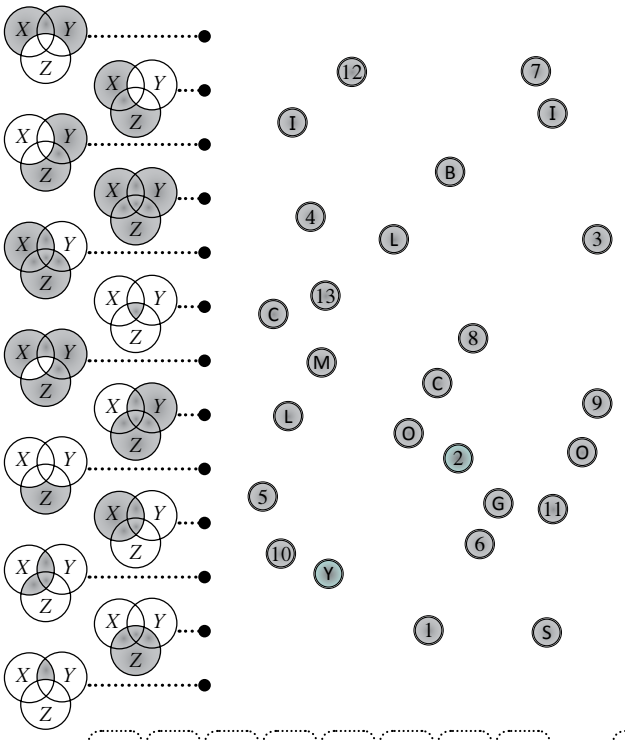
n. $\overline{(Q \cup S) - R}$



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



2. Link the descriptions below with the matching Venn diagram using straight lines to reveal the title of the book John Venn wrote to introduce Venn diagrams back in 1881.



- Y or Z but not X
- Either X or Z
- X or Y but not Z
- Y or Z
- X and Y but not Z
- Only set X
- X and Y and Z
- Either (X and Z) or (X and Y)
- Not Y
- $\overline{X}$ or $\overline{Y}$
- Everything in X, Y or Z
- Not $\overline{Z}$
- Not (X and Z)

1	2	3	4	5	6	7	8	9	10	11	12	13