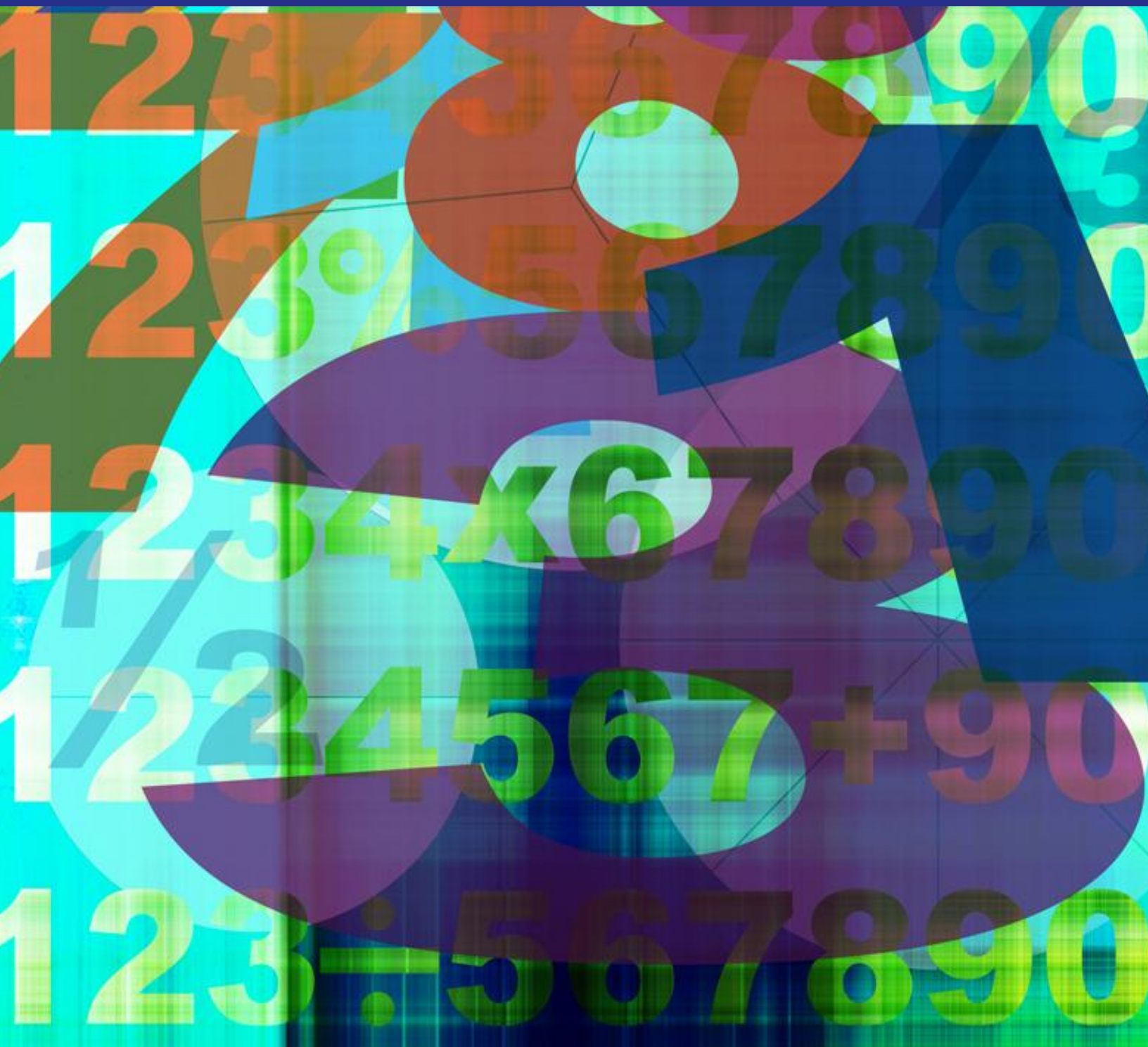
Level 4 Mathematics

Answers to tasks in Learner Pack



N1 Calculator

Now you try this

The recipe for chocolate cake says you need a baking tray with an area of 12.57cm. You have two baking trays one has radius of 2cm and the other has a radius of 3cm. Which baking tray should you use?

Answer: 2cm

Sean is sharing a flat with two other guys. He pays one third of the Gas bill and 38% of the ESB bill but does not pay for the Cable TV bill. This month's Gas bill is €76.50 and the ESB bill is €64.20. How much does Sean pay for the Gas bill and for the ESB bill?

Answer €25.50 + €24.40 = €49.90

How much change should Sean's flatmate give him if he left 3 twenty euro notes towards his share of the bill?

Answer: €60 - €49.90 = €10.10

N2 The Telethon

For you to try

(i) Samantha must sell 95 tickets to reach her target.

(ii) On the first night 37 people attended. Therefore total amount raised on that night was: 37 x 27 = 999
On the second night 89 people attended so the total money raised on this night was
89 x 27 = 2403
Therefore the total amount raised over the two nights was 999 + 2403 = €3,402

Related Activity

(i) There are 31 days in March and so each day Jenny must produce 279 ÷ 31 = 9 toys in order to receive her bonus.

(ii) Her gross pay for November was 152 x 2 = €304

(iii) Again there are 31 days in December and 341 ÷ 31 = 11. As a result in December Jenny must produce 11 toys per day to get her bonus.

(iv) In December Jenny's gross pay is equal to (350 x 2) + Bonus = 700 + 100 = €800

N3 Taxing goods

For you to try (1)

4% = $\frac{4}{100}$

Common factor of 4

- 4% = $\frac{1}{25}$

6% = $\frac{6}{100}$

Common factor of 2

- 6% = $\frac{3}{50}$

8.25% = $\frac{8.25}{100}$ = $\frac{825}{10000}$

Common factor of 25

8.25% = $\frac{33}{400}$

For you to try (2)

21% of €350.90 = $\frac{21}{100}$ x €350.90 = $\frac{7368.90}{100}$

- VAT to be paid = €73.689 = €73.69

New television = 350.90 + 73.69 = €424.59

Profit = 5% of €424.59

= $\frac{1}{20}$ x €424.59 = 21.2295

- Company will make €21.23 profit.

Related Activity N3

Item	Cost
New bumper	€165
New windscreen	€226
New tyres	€180
New Wing Mirror	€129.90
Total Cost of Parts (Excluding VAT)	€700.90
VAT (@ 21%)	€147.19
Total Cost of Parts (Including VAT)	€848.09
Total Cost of Labour (Excluding VAT)	€323.20
VAT (@ 13.5%)	€43.63
Total Cost of Labour (Including VAT)	€366.83
Total Cost of Labour & Parts	€1214.92

N4 He shoots, He scores!

Now you try this

Malouda = $\frac{12}{103}$

Anelka = $\frac{11}{103}$

- As percentage: $\frac{11}{103}$ x $\frac{100}{1}$ = $\frac{1100}{103}$ = 10.679%

Anelka = 11%

(a) Anelka & Drogba = 11 + 28 = 39%

Lampard & Malouda:

Malouda = $\frac{12}{103}$ x $\frac{100}{1}$ = $\frac{1200}{103}$ = 11.65%

Malouda = 12%

- Lampard & Malouda = 12 + 21 = 33%
- Anelka & Drogba are the better combination

(b) Malouda & Drogba = 12 + 28 = 40%

Lampard & Anelka = 21 + 11 = 32%

- Drogba & Malouda are the better combination.

N5 National Television Awards

Now you try this (1)

0.32 of the vote was for Coronation Street

- $0.32 = \frac{32}{100}$

$\frac{8}{25}$ of the vote was for Coronation Street

$\frac{3}{10}$ of the votes were cast for Eastenders

- As a percentage: $\frac{3}{10} \times \frac{100}{1} = \frac{300}{10} = 30\%$
- 30% voted for Eastenders.

Now you try this (2)

0.11 voted for Strictly Come Dancing.

- $0.11 = \frac{11}{100}$

$\frac{11}{100}$ of 350,000 $= \frac{3850000}{100} = 38{,}500$

⇒ 38,500 votes were for Strictly Come Dancing.

22% of the votes were for Dancing on Ice.

$22\% = {}^{22}/_{100}$.

${}^{22}/_{100}$ of 350,000 = 77,000

- Difference = 77,000 – 38,500 = 38,500
- Britain's Got Talent got 350,000 – 161,000 – 73500 – 38500 = 77,000
  Britain's Got Talent got the second highest number of votes.

N6 Salaries and wages

Now you try this

1. The sales assistant's **monthly gross pay is** €1720
2. Mr Murphy's payslip is:

Name: Mr Murphy **Staff Number:** **RSI Number:** **Date:**	**Tax credit €111.**
Pay Basic Pay: 39 x €9.80 Overtime: 5 hours x time and a half **Gross Pay = €455.70** **Taxable Income = €344.70**	Deductions Income Levy 2% €9.11 PAYE 20% €68.94 PRSI 6% €20.68 Pension €3.30 **Total Deductions €102.03** **Net Pay €353.07**

N7 Profit and loss

Now you try this

1. Sean's Salary is €59,524.

2. Mrs. Smyth's gross profit was €17489.45.

3. The total cost of the job was €143.35.

N8 Tourist Destinations

Now you try this (1)

History Museum: St. Stephens Green = 5:15

Common Factor of 5

- Ratio = 1:3

Now you try this (2)

Giant's Causeway: Cliffs of Moher = 26: 24

Common Factor of 2

- Ratio =13:12

Giant's Causeway: Ring of Kerry = 26:12

- As fraction: $\frac{26}{12} = \frac{13}{6} = \frac{2.16}{1}$
- For every 1 person that visited the Ring of Kerry 2.16 people visited the Giant's Causeway.

N9 Route 66

Now you try this (1)

(a) For every €1 I have I would get 0.72 Latvian Lat

(b) In order to get €1 I would need 1.40 Australian Dollars

Now you try this (2)

(a) First we must change $40 to euro

=> 40 ÷ 1.378 = 29.0275

=> The jacket costs €29.03 and so the jacket in the outlet would be the cheaper option.

* Note students may also do this question by converting euro to American dollars

(b) €200 in dollars: 200 x 1.20 = 240

=> The student had US$240 extra.

N10 Planets

Now you try this (1)

Distance between Pluto and Earth: 5.913×10^9

Therefore in standard form this distance is 5,913,000,000 kilometres.

Now you try this (2)

Distance between the Earth and the Moon is 384,400.

Therefore in scientific notation this distance is 3.844×10^5

Distance between the Moon and Mars is 42,100,000.

Therefore in scientific notation this distance is 4.21×10^7

N11 X Factor Voting

Now you try this (1)

11.348 = 11.3

15.671 = 15.7

13.446 = 13.45

22.356 = 22.36

Now you try this (2)

1. Olly: 18.6879 = 18.69%

   Jedward: 18.7935 = 18.79%

2. Difference: 18.79 – 18.69 = 0.1

   Therefore there is only 0.1% in the difference between the two votes.

3. Joe: 61.5673 = 61.6%

   Olly: 34.831 = 34.8%

   Stacey: 3.601 = 3.6%

N12 Antique Road Trip

Now you try this (1)

Expert 1

Estimate = 4,000

Difference = 4,000 – 2,500 = 1,500

Percentage Error = $\frac{1500}{2500} \times \frac{100}{1}\%$

Percentage Error = 60%

Expert 2

Estimate = 2,000

Difference = 2,500 – 2,000 = 500

Percentage Error = $\frac{500}{2500} \times \frac{100}{1}\%$

Percentage Error = 20%

N13 Indices

Question 1

(a) 2^2 2^3 2^5 2^8

(b) 3^4 3^3 3^7 3^{10}

(c) 6^4 6^4 6^8 6^{12}

(d) 4^6 4^7 4^{13} 4^{20}

Question 2

(i) $3^3 = 27$ and $5^2 = 25$. Therefore 3^3 is bigger.

(ii) $15^2 = 225$ and $6^3 = 216$. Therefore 15^2 is bigger.

N14 Concert Volume

Question 1

pH = - $\log_{10}$ (hydrogen ion concentration)

Hydrogen ion concentration for lemon juice = 1 x 10-2

1 x 10-2 = 0.01

- pH = - $\log_{10}$ (0.01) = -(-2) = 2

Question 2

Carbon Concert: $\log \left(\frac{1451.87}{0.00578}\right)^{20} = 20\log\left(\frac{1451.87}{0.00578}\right)$

= 20log (251,188.5813) = 20(5.399) = 107.99 dB

Headbash Concert: $\log \left(\frac{13842.87}{0.098}\right)^{20} = 20\log\left(\frac{13482.87}{0.098}\right)$

= 20log (137,580.3061) = 20(5.139) = 102.77 dB.

Difference between the two concerts: 107.99 – 102.77 = 5.22

The Carbon concert is more damaging on the human ear.

N15 Earthquake

Solutions are given in the Learner Pack.

N16 Simple Interest

Question 1

Total cost of repayments = 24 x 32.50 = €780

Original cost of washing machine was €650.

- Interest = 780 – 650 = €130

Question 2

The new car costs €12,000. Sean gets €9,000 for his old car and he needs to borrow the difference.

- Sean needs to borrow 12000 – 9000 = €3,000.

In total Sean pays back €3,600 but the original loan was €3,000 so the interest amounts to €600 (3,600 – 3,000).

We know that the formula for simple interest is $I = \frac{R}{100} \times P \times T$.

In this instance I = 600, P = 3,000, T = 5 and we must find R.

- 600 = I/100 x 3000 x 5 = 15,000I/ 100

600 x 100 = 15,000 I

60,000 = 15,000 I

I = 4 That is, the Interest Rate = 4%

N17 Compound Interest

Question 1

The formula for compound interest is:

$$A = P\left(1 + \frac{R}{100}\right)^{n}$$

First we must identify what variables we know.

In this question: A = 6,000 P =?, I = 4%/4 = 1% (Since it is compounded quarterly) n = 8

- 6000 = P (1 + 0.01)8

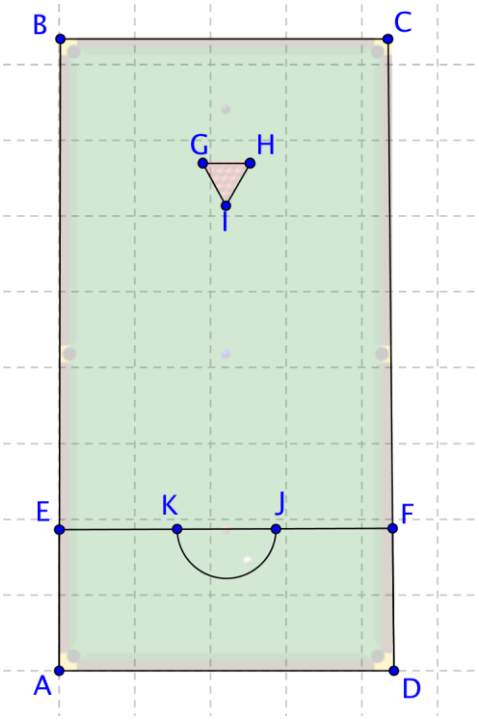
6000 = P(1.082856)

P = 6000 ÷ 1.082856

P = €5540.89

G1 Soccer, Snooker and Handball

'Now you try this' section



The semicircle is the curve joining K and J.

- The rectangles are formed by the lines joining ABCD, ADFE and EFCB.
- The triangle joins the points GHI.
- The semicircle is the curve joining K and J.
- In the handball court the front and back walls are squares.

G2 Mirror, mirror on the wall…

'Now you try this' section

- 'I AM TONY' Changes because of 'N'
- 'I HIT TIM' No change
- 'THAT HAT ON YOU' Changes because of 'N'
- 'WE HIT TOM' Changes because of 'E'
- 'THAT HAT WITH YOU' No change

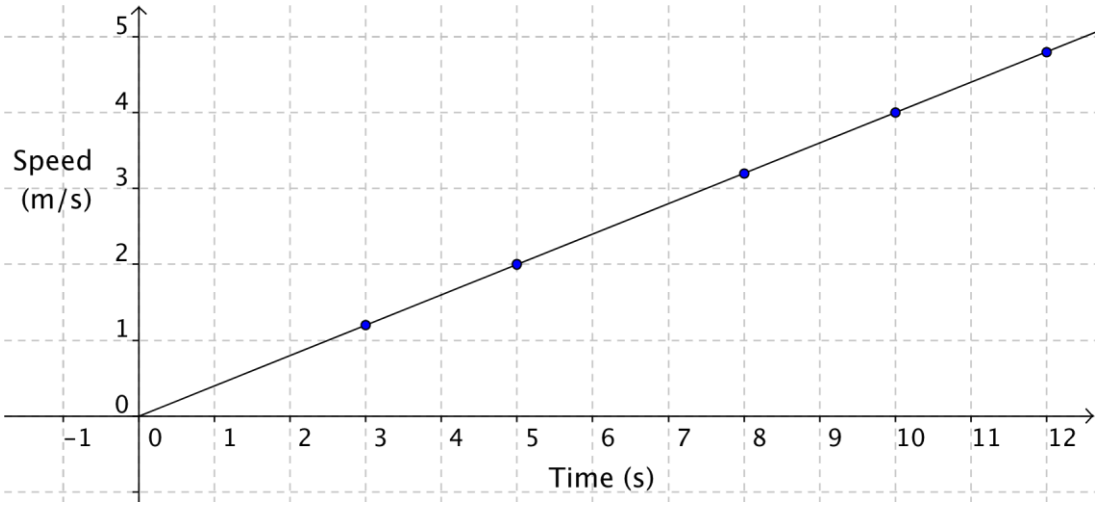
G3 Hanging cups

'Now you try this' section

- A = (1, 3)
- B = (5, 2)
- C = (10,4)

G4 Cookery Lessons

'Now you try this' section

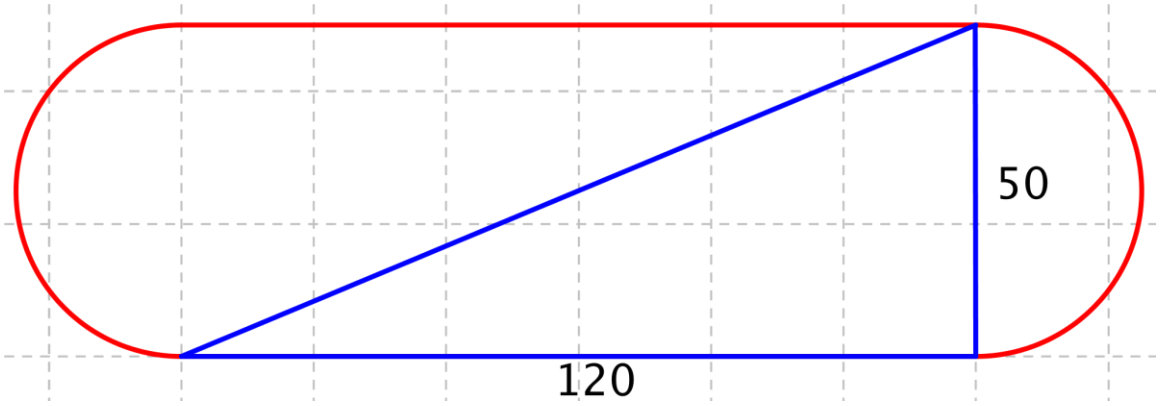


- After 6 seconds the speed of the car is 2.4 m/s
- The car takes 11 seconds to reach a speed of 4.4 m/s

G5 As the Crow Flies…

'Now you try this' section

- Complete the diagram to get



- Pythagoras Theorem says that the square on the hypotenuse of a right-angled triangle is equal to the squares on the other two sides. Hence the diagonal, *d*, is

$$d^2 = 120^2 + 50^2$$
$$d^2 = 14400 + 2500$$
$$d^2 = 16900$$
$$d = \sqrt{16900}$$
$$d = 130$$

G6 Measuring the world

'**Now you try this'** section

- Distance between A and B

$$d = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$
$$|AB| = \sqrt{(-4-1)^2 + (7-(-5))^2}$$
$$|AB| = \sqrt{(-5)^2 + (12)^2}$$
$$|AB| = \sqrt{25+144}$$
$$|AB| = \sqrt{169}$$
$$|AB| = 13$$

- Distance between B and C

$$|BC| = \sqrt{(1-5)^2 + (-5-(-2))^2}$$
$$|BC| = \sqrt{16+9}$$
$$|BC| = 5$$

- Distance between B and D

$$|BD| = \sqrt{(1-(-7))^2 + (-5-10)^2}$$
$$|BD| = \sqrt{64+225}$$
$$|BD| = 17$$

- Distance between A and E

$$|AE| = \sqrt{(-4-0)^2 + (7-4)^2}$$
$$|AE| = \sqrt{16+9}$$
$$|AE| = 5$$

- Distance between A and D

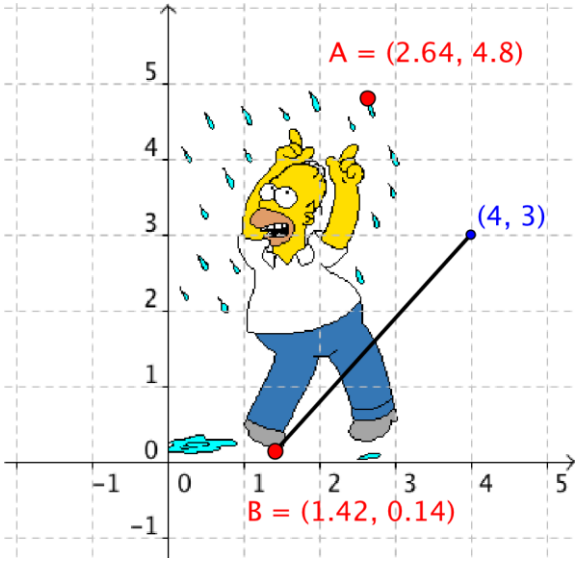
$$|AD| = \sqrt{(-4-(-7))^2 + (7-10)^2}$$
$$|AD| = \sqrt{9+9}$$
$$|AD| = \sqrt{18}$$
$$|AD| = 4.24$$

G7 Finding the Centre

'Now you try this' section

- Centre of the line joining A and B is

$$\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)=\left(\frac{2.64+1.42}{2},\frac{4.8+0.14}{2}\right)$$
$$=\left(\frac{4.06}{2},\frac{4.94}{2}\right)$$
$$=(2.03,2.47)$$



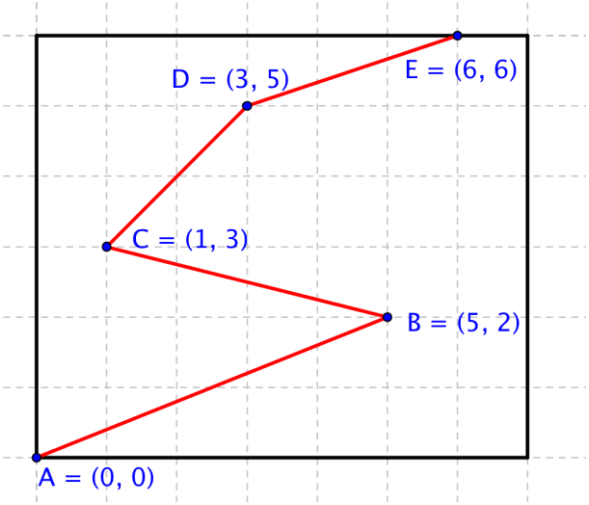
This segment joins (1.42, 0.14) to (4, 3). The midpoint is

$$\left(\frac{1.42+4}{2},\frac{0.14+3}{2}\right)=(2.71,1.57)$$

G8 Hills and Valleys

'Now you try this' section

- Elevation of A above B is $60 - 10 = 50$ metres.
- Horizontal distance from B to A: Coordinate the plane with A (0, 0) as the origin. The coordinates of B are then (6, 5). The map distance between A and B is $\sqrt{(6-0)^2 + (5-0)^2} = \sqrt{36+25} = 7.81$ centimetres. The scale of the map represents 100 metres by 1 centimetre so the horizontal distance between B and A is $100 \times 7.81 = 781$ metres.
- Slope of the road is $\frac{50}{781} = 0.064$
- Related Activity: Real world centres

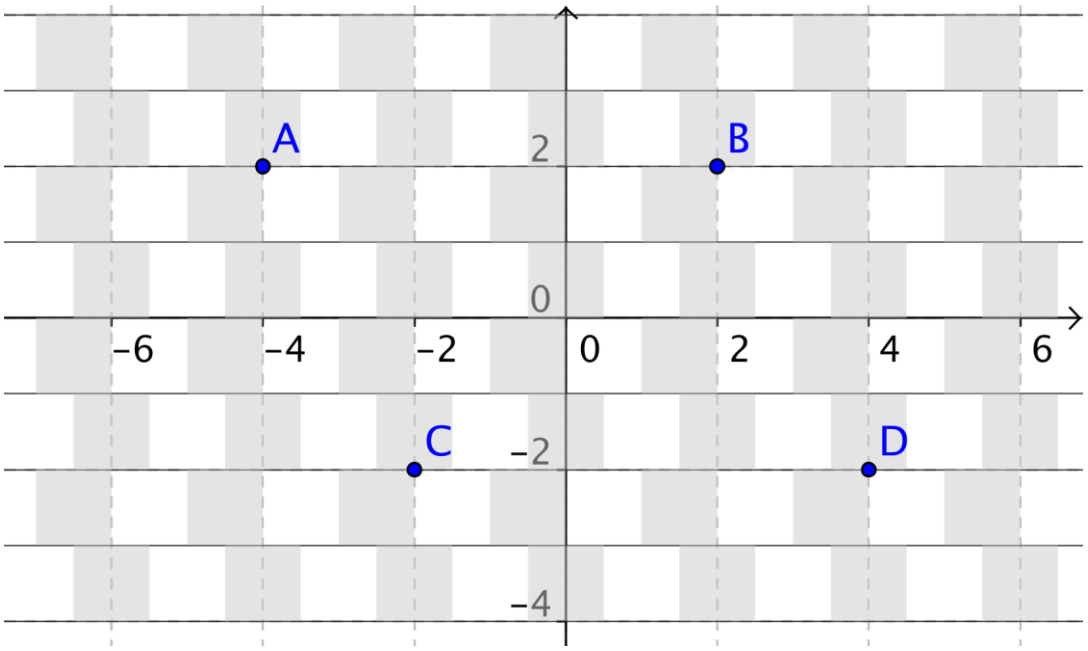


The diagram above has added names to each point to make it easier to discuss them.

- Slope of AB is $\frac{y_2 - y_1}{x_2 - x_1} = \frac{2-0}{5-0} = \frac{2}{5}$
- Slope of BC is $\frac{3-2}{1-5} = \frac{1}{-4} = -\frac{1}{4}$
- Slope of CD is $\frac{5-3}{3-1} = \frac{2}{2} = 1$
- Slope of DE is $\frac{6-5}{6-3} = \frac{1}{3}$

G9 Optical Illusions

'Now you try this' section



- A is (–4, 2). B is (2, 2).
- The point C is (–2, –2) and D is (4, –2).
- The slope of AB is $\frac{2-2}{2-(-4)}=\frac{0}{6}=0$
- The slope of CD is $\frac{-2-(-2)}{4-(-2)}=\frac{-2+2}{4+2}=\frac{0}{6}=0$
- The slopes are equal so the lines are parallel.

G10 Playing Pool

'**Now you try this'** section

- $m \times \frac{2}{3} = -1 \Rightarrow m = -1 \times \frac{3}{2} = -\frac{3}{2}$
- $m \times \left(-\frac{3}{7}\right) = -1 \Rightarrow m = -1 \times \left(-\frac{7}{3}\right) = \frac{7}{3}$
- $m \times 0.5 = -1 \Rightarrow m = \frac{-1}{0.5} = -2$

G11 Playing Pong on the iPod

'Now you try this' section

- First get the slope of the line

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$
$$m = \frac{5-4}{6-8}$$
$$m = \frac{1}{-2}$$
$$m = -\frac{1}{2}$$

Now use this value of the slope with one of the points to get the equation of the line

$$y - y_1 = m(x - x_1)$$
$$y - 5 = -\frac{1}{2}(x-6)$$
$$2y - 10 = -x + 6$$
$$x + 2y = 16$$

- At the bottom wall $y = 0$. Substitute this into the equation of the line.

$$3x - 4y = 12$$
$$3x - 0 = 12$$
$$x = \frac{12}{3}$$
$$x = 4$$

G12 Designing a Flower Bed

'Now you try this' section

- The new circle of flowers will occupy the circle

$$x^2 + y^2 = r^2$$
$$x^2 + y^2 = 2^2$$
$$x^2 + y^2 = 4$$

- To get the radius of this next circle we must first divide by 16

$$16x^2 + 16y^2 = 169$$
$$\Rightarrow x^2 + y^2 = \frac{169}{16}$$
$$\Rightarrow x^2 + y^2 = \left(\frac{13}{4}\right)^2$$
$$\Rightarrow r = \frac{13}{4}$$

G13 Playing Shove Ha'penny

'Now you try this' section

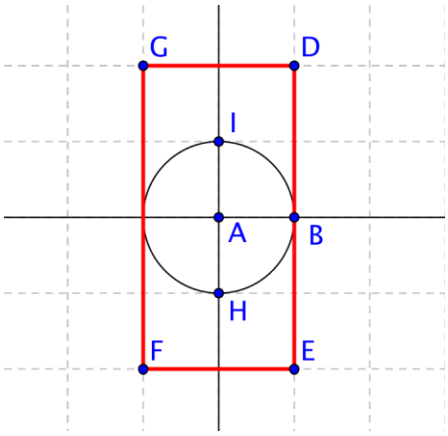
- The blue line meets the circle at $\left(\frac{1}{2},0\right)$
- The equation of the blue line is

$$xx_1 + yy_1 = r^2$$
$$x\left(\frac{1}{2}\right) + y(0) = \left(\frac{1}{2}\right)^2$$
$$\frac{x}{2} + 0 = \frac{1}{4}$$
$$x = \frac{2}{4}$$
$$x = \frac{1}{2}$$
$$2x = 1$$

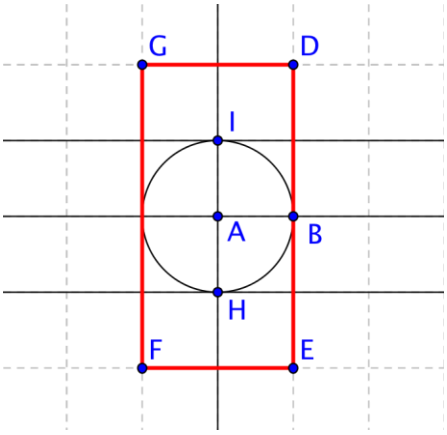
G14 Creating a Pattern

'Now you try this' section

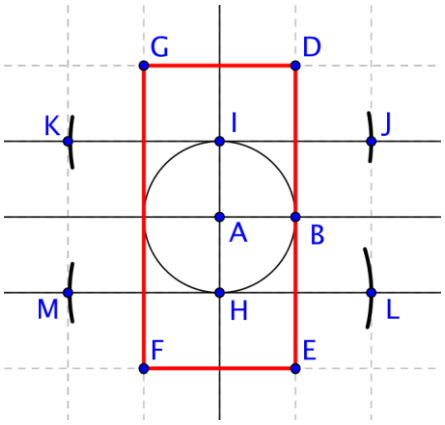
- Use your set squares to draw a line through A perpendicular to AB and let it meet the circle at I and H.



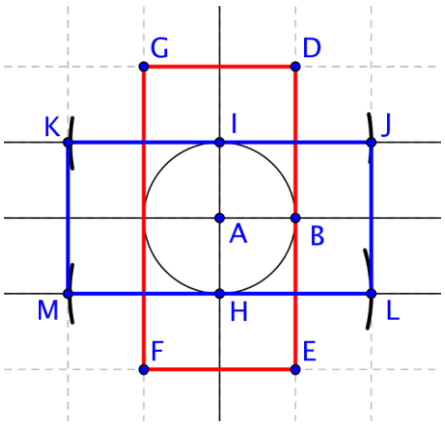
Use your set squares to draw lines through I and H perpendicular to the line HI.



Adjust the radius of your compass to 2. With I as centre mark two points to the left and right of I. Then with H as centre mark two points to the left and right of H.

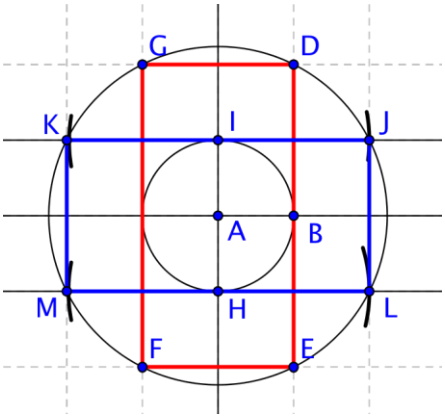


Join the points KJLM.



Note: There are many others method that would correctly perform the previous construction.

- With the centre of your compass at the point A adjust the radius to any of AJ, AD, AG, AK, AM, AF, AE or AL. Draw a circle.



G15 Measuring a Room

'Now you try this' section

- The height of the side wall is the same as the height of the yellow wall.

$$\begin{aligned} A &= l \times b \\ &= 4.3 \times 2.7 \\ &= 11.61 m^2 \end{aligned}$$

- There is $2 \times 2 \times 11.61 = 46.44 m^2$ of paint needed.
- Calculate the cost by first finding the amount of paint in litres:

$$\begin{aligned} 8.6 m^2 &= 1 l \\ 1 m^2 &= \frac{1}{8.6} l \\ 46.44 m^2 &= \frac{46.44}{8.6} l \\ 46.44 m^2 &= 5.4 l \end{aligned}$$

  which means that we have to get 3 containers of paint as two would not be enough. The cost will be $3 \times 16.87 =$ €50.61

- The amount of masking tape is $2 \times 2(l + b) = 4 \times (4.3 + 2.7) = 28 m$

A1 Keeping the Score in Rugby

'Now you try this' section

- To calculate Biarritz's total score we must substitute in values for each variable.

  S = 5(1) + 2(1) + 3(0) + 3(4)

  S = 5 + 2 + 0 + 12

  S = 19

- To calculate Munster's new total score we must substitute in values for each variable.

  S = 5(1) + 2(1) + 3(1) + 3(3)

  S = 5 + 2 + 3 + 9

  S = 19

  If this was Munster's score the match would have been a draw

Practise your skills section

- Step 1: allow different variables to represent the numerical value of different scores
  - a goal = a
  - an over is worth = b
  - a behind is worth = c

- Step 2: Write an expression for total score (S)

  S = 6a + 3b + 1c

- Step 3: Calculate the total score of each team.

  Ireland: S = 6(2) + 3(19) +1(23)

  = 12 + 57 + 23

  = 92

  Australia: S = 6(0) + 3(28) +1(18)

  = 0 + 84 + 18

  = 102

  Australia won the series.

A2 Lifting Weights

'Now you try this' section

- To calculate the unknown weight we must isolate the variable.
  x + 58 = 88
  x + 58 – 58 = 88 – 58
  x = 30
  The unknown weight is 30kg

- To calculate the current weight on the left hand side of the bar we must isolate the variable.
  x - 25 = 45
  x – 25 + 25 = 45 + 25
  x = 70
  The current weight on the left hand side of the bar is 70kg

Practise your skills section

- To calculate the amount of votes Mary received from Ireland we must isolate the variable.
  x + 565,000 = 780,000
  x + 565,000 – 565,000 = 780,000 – 565,000
  x = 215,000
  Mary received 215,000 votes from Ireland.

A3 Soap Wars

'Now you try this' section

- x + 3x = 12

  4x = 12

  x = 3

  Therefore, Eastenders had 3 million viewers; Emmerdale had 9 million viewers.

- x + 4x = 35

  5x = 35

  x = 7

  Therefore, Emmerdale had 7 million viewers; Coronation Street had 28 million viewers.

Practise your skills section

- x + 2x = 162,000

  3x = 162,000

  x = 54,000

  Therefore:

  The Irish Examiner has a daily circulation of 54,000;

  The Irish Times has a daily circulation of 108,000.

A4 How much is a Ticket?

'Now you try this' section

- 150x + 350y = 4200
  200x + 300y = 4100

Step 1: Label the equations A and B.

$$150x + 350y = 4200 \quad [A]$$
$$200x + 300y = 4100 \quad [B]$$

Step 2: Get the same coefficients for either x **or** y.

If we multiply equation [A] by 4 and equation [B] by 3 then we will have the same x coefficients.

$$600x + 1400y = 16800 \quad [A]$$
$$600x + 900y = 12300 \quad [B]$$

Step 3: Make sure the chosen coefficients have opposite signs (i.e. + and -)

If we multiply equation [B] by -1 then we will have opposite signs.

$$600x + 1400y = 16800 \quad [A]$$
$$-600x - 900y = -12300 \quad [B]$$

Step 4: Add the two equations together.

$$600x + 1400y = 16800 \quad [A]$$
$$\underline{-600x - 900y = -12300} \quad [B]$$
$$500y = 4500$$

Step 5: Solve for y.

$$500y = 4500$$
$$y = 9$$

Step 6: Replace y in either equation to solve for x.

Take, for example equation [B]:

$200x + 300y = 4100$

$200x + 300(9) = 4100$

$200x + 2700 = 4100$

$200x + 2700 – 2700 = 4100 – 2700$

$200x = 1400$

$x = 7$

Therefore:

- the cost of an adult ticket (y) = €9
- the cost of a student ticket(x) = €7

- $2000x + 20000y = 320000$

  $3000x + 19000y = 315000$

Step 1: Label the equations A and B.

$$2000x + 20000y = 320000 \text{ [A]}$$
$$3000x + 19000y = 315000 \text{ [B]}$$

Step 2: Get the same coefficients for either x **or** y.

If we multiply equation [A] by 3 and equation [B] by 2 then we will have the same x coefficients.

$$6000x + 60000y = 960000 \text{ [A]}$$

Step 3: Make sure the chosen coefficients have opposite signs (i.e. + and -).

If we multiply equation [B] by -1 then we will have opposite signs.

$$6000x + 60000y = 960000 \text{ [A]}$$
$$- \quad 6000x - 38000y = -630000 \text{ [B]}$$

Step 4: Add the two equations together.

$$6000x + 60000y = 960000 \text{ [A]}$$
$$- \quad \underline{6000x - 38000y = -630000} \text{ [B]}$$
$$22000y = 330000$$

Step 5: Solve for y.

$$22000y = 330000$$
$$y = 15$$

Step 6: Replace y in either equation to solve for x.

Take, for example equation [A]:

$2000x + 20000y = 320000$

$2000x + 20000(15) = 320000$

$2000x + 300000 = 320000$

$2000x + 300000 - 300000 = 320000 - 300000$

$2000x = 20000$

$x = 10$

Therefore:

- the cost of an seated ticket (y) = €15
- the cost of a standing ticket(x) = €10

Practise your skills section

- 900x + 4y = 3800
  1150x + 2y = 2600

  Step 1: Label the equations A and B.

  900x + 4y = 3800 [A]
  1150x + 2y = 2600 [B]

  Step 2: Get the same coefficients for either x **or** y.

  If we multiply equation [B] by 2 then we will have the same x coefficients:

  900x + 4y = 3800 [A]
  2300x + 4y = 5200 [B]

  Step 3: Make sure the chosen coefficients have opposite signs (i.e. + and -).

  If we multiply equation [A] by -1 then we will have opposite signs:

  - 900x - 4y = -3800 [A]
  2300x + 4y = 5200 [B]

Step 4: Add the two equations together.

$$-900x - 4y = -3800 \quad [A]$$
$$\underline{2300x + 4y = 5200} \quad [B]$$
$$1400x = 1400$$

Step 5: Solve for y.

$$1400x = 1400$$
$$x = 1$$

Step 6: Replace x in either equation to solve for y.

Take, for example equation [A]:

$900x + 4y = 3800$

$900(1) + 4y = 3800$

$900(1) + 4y = 3800$

$900 - 900 + 4y = 3800 - 900$

$4y = 2900$

$y = 725$

Therefore :

- there is 1MB in a song
- there are 725MB in a video.

A5 How many text messages can I send?

'**Now you try this'** section

- $0.12x + 30 \leq 45$

  $0.12x + 30 - 30 \leq 45 - 30$

  $0.12x \leq 15$

  $x \leq 125$

Aoife can send 125 text messages per month without being charged extra.

- $0.09x + 32 \leq 50$

  $0.09x + 32 - 32 \leq 50 - 32$

  $0.09x \leq 18$

  $x \leq 200$

Fiona can send 200 text messages per month without being charged extra.

Practise your skills section

- $x + 3 \geq 68$

  $x + 3 - 3 \geq 68 - 3$

  $x \geq 65$

  The ticket cost €65.

A6 How many Number 1 hits had The Beatles?

'Now you try this' section

- x + 26 = 43
  x + 26 – 26 = 43 – 26
  x = 17
  The Beatles had 17 Number 1 hits in the UK.

- x – 11 = 16
  x – 11 + 11 = 16 + 11
  x = 27
  The Beatles had 27 Number 1 hits worldwide.

Practise your skills section

- x + 17 = 39
  x + 17 – 17 = 39 – 17
  x = 22
  U2 have won 22 Grammy Awards.

A7 How successful are Manchester United?

'Now you try this' section

- Step 1: Let x stand for the number of FA Cup titles won by Chelsea.
  Let (x + 5) stand for the number of titles won by Manchester United.

  Step 2: Form the equation
  x + x + 5 = 17

  Step 3: Solve
  2x + 5 - 5 = 17 - 5
  2x = 12
  x = 6

  Manchester United have won the FA Cup 11 times.

- Step 1: Let x stand for the number of League Cup titles won by Manchester United.
  Let (x + 3) stand for the number of titles won by Liverpool.

  Step 2: Form the equation
  x + x + 3 = 11

  Step 3: Solve
  2x + 3 - 3 = 11 - 3
  2x = 8
  x = 4

  Manchester United have won the League Cup 4 times.

Practise your skills section

Step 1: Let x stand for the age of Brian Cowen
Let (x + 11) stand for the age of Bertie Ahern

Step 2: Form the equation
x + x + 11 = 107

Step 3: Solve
2x + 11 - 11 = 107 - 11
2x = 96
x = 48

Brian Cowen is 48 years old.

A8 How wide was that ship?

'Now you try this' section

- Step 1: Let width = x
  Let length = x + 150

  Step 2: Form the equation (Represent perimeter in terms of x).
  Perimeter = 2(width) + 2(length)
  = 2(x) + 2(x + 150)
  = 2x + 2x + 300
  Perimeter = 4x + 300

  Step 3: Fill in remaining information and solve (Perimeter = 420).
  4x + 300 = 420
  4x + 300 – 300 = 420 - 300
  4x = 120
  x = 30

Therefore the USS Arizona was 30 metres wide .

- Step 1: Let width = x
  Let length = x + 216

  Step 2: Form the equation. (Represent perimeter in terms of x).
  Perimeter = 2(width) + 2(length)
  = 2(x) + 2(x + 216)
  = 2x + 2x + 432
  Perimeter = 4x + 432

  Step 3: Fill in remaining information and solve (Perimeter = 592).
  4x + 432 = 592
  4x + 432– 432 = 592 - 432
  4x = 160
  x = 40

Therefore the Yamato was 40 metres wide.

Practise your skills section

Step 1: Let width = x
Let length = x + 13

Step 2: Form the equation (Represent perimeter in terms of x)
Perimeter = 2(width) + 2(length)
= 2(x) + 2(x + 13)
= 2x + 2x + 26
Perimeter = 4x + 26

Step 3: Fill in remaining information and solve (i.e. Perimeter = 86)
4x + 26 = 86
4x + 26 – 26 = 86 - 26
4x = 60
x = 15

Therefore a basketball court is 15 metres wide.

D1 iPhone

'Now you try this'

- Population: All members of the gym
  Sample: The 250 members who responded
  Variable: How do the members of the gym rate the customer services on a scale of 0-10?
  Statistic: Average rating of 5 (out of possible 10) for customer services.

D2 Cancer Trials

Now you try this

- Independent variable: This is the level of physical activity the subjects are required to do. It is varied by the researcher since some students are asked to do more physical activity than others. This is done so as to study the effects the amount of physical activity has on the subjects' health.

  Dependent variable: The dependent variable is the subjects' health which is dependent on the amount of physical activity the subject was asked to do.

D3 Families, Time watching TV

Now you try this

- 1. In a typical week, how often would you exercise?

  Data will be discrete because it will consist of a finite number of numeric values i.e. whole numbers only.

  2. How much of your weekly money do you spend on chocolate?

  The data will be continuous since the price of chocolate can include an infinite number of numeric values (i.e. decimals) e.g. €1.10.

  3. How long (in days or weeks) since your last exercised?

  Data will be discrete because it will consist of a finite number of numeric values i.e. whole numbers only.

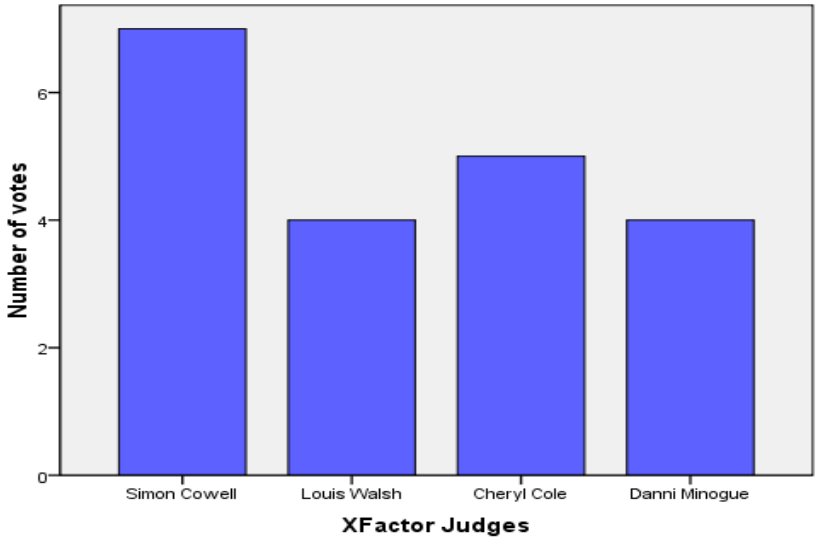
  4. Rate your interest in exercise on a scale of 0 to 10 where 0 represents no interest and 10 represents extremely interested.

  This depends on whether a person interprets the scale to include only whole numbers from 0-10 or also to include half numbers e.g. 5.5. Assuming it only includes whole numbers, the data will be discrete.

  NOTE: You can accept continuous data as a correct answer if the trainee can explain why.

D4 Families, Time watching TV

Now you try this



NOTE: This was produced using a computer packages. The trainees bar chart should have the numbers labelled on the x-axis. It is essential that the trainees keep the width of the bars the same and the gap between the bars should also be equally spaced.

D5 Careers

Now you try this

- The greatest sector was those who emigrated. We know because the frequency of people in this category is highest (11 out of the 25 teachers). We also know because the sector has the largest angle and so takes up the most space in the pie chart.

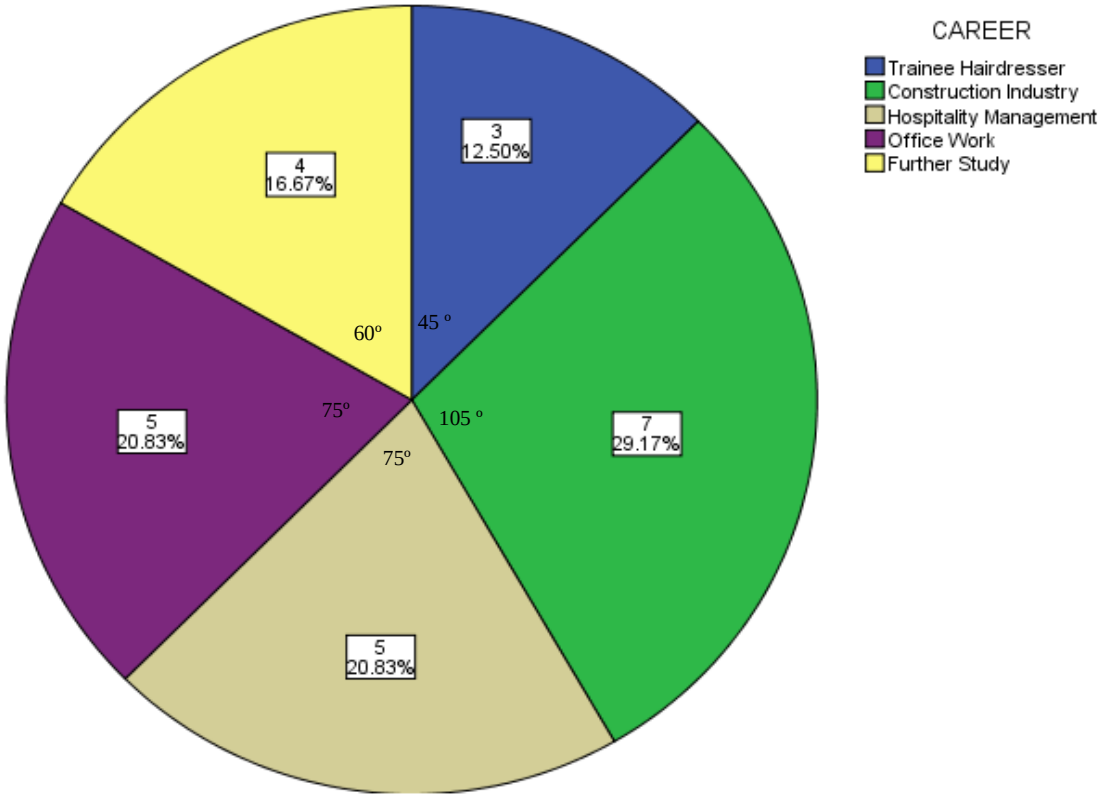
  We know that less than half (40% since 10/25 = 40%) of the teachers who graduated are currently employed. 5 teachers are employed while 4 have gone on to further study.

  The majority (44% since 11/25 = 44%) have had to leave the country suggesting that the demand for teachers may not be too high at the moment.

D6 Careers 2

Now you try this

- The pie chart should look similar to the one in the resource pack. It will not be exactly the same as computer programme was used to produce this pie chart. Trainees should have the sectors clearly visible with the angle inserted. The percentage does not need to be calculated as in the pie chart below.



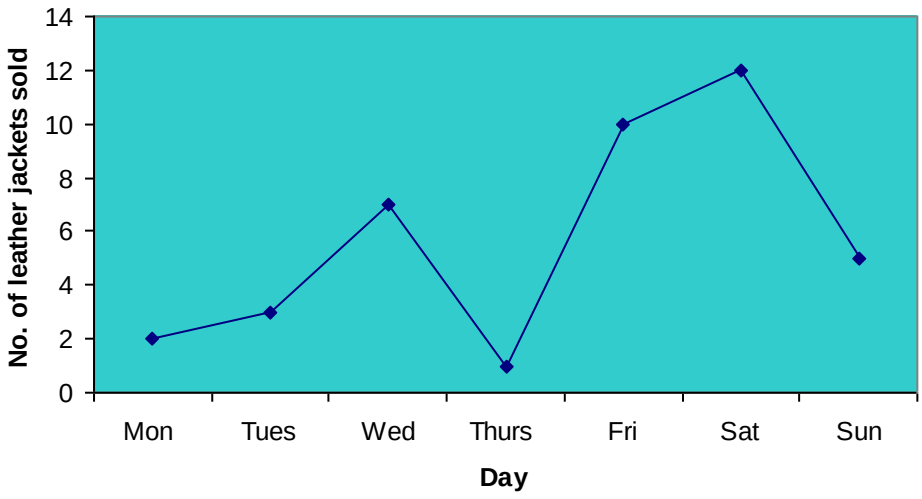
D7 Fashion

Task Sheet 1 'Now you try this' section

- The frequency table must first be completed:

Day	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Leather Jacket Sales	2	3	7	1	10	12	5

The trend graph should look similar to this one produced using a computer programme. All axes should be labelled, points plotted and a trend line draw between all points. Spacing is also important.



D8 iPod, Phone Calls

Now you try this

- The grouped frequency table is completed. Each piece of data should only be inserted once e.g. Two players scored 6 points and these are placed in section 3-6 and not in section 6-12.

Number of points scored	0-3	3 - 6	6-12	12-18	18-24
Number of players	2	3	3	2	2

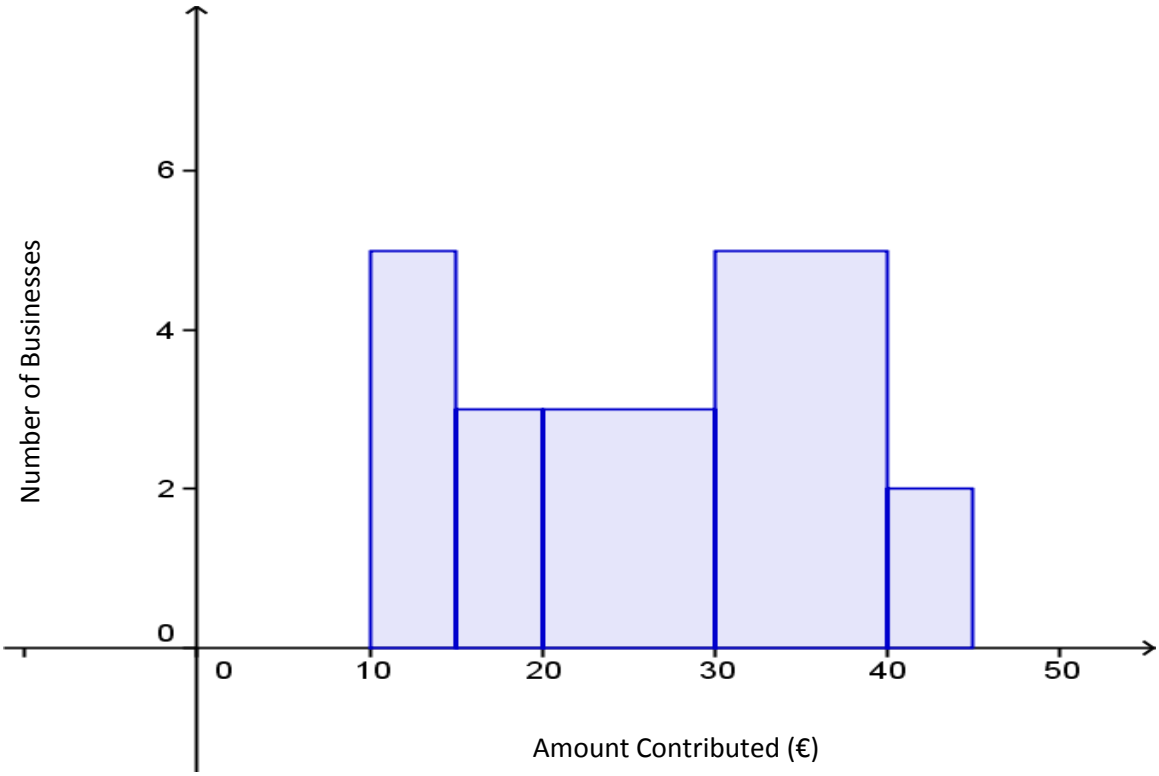
D9 Phone Calls, Charity Donations

Now you try this

- A histogram is drawn based on the grouped frequency table.

Amount (€)	10-15	15-20	20-30	30-40	40-45
Number of businesses who contributed	5	3	6	10	2

The histogram should be similar to the following one produced by a computer programme. Trainees should remember that the area from 20-30 and 30-40 is double the other units so they will need to divide the frequency by 2 to get the correct height of the bar.



We can make some judgements based on the histogram such as €30 to €40 was the amount contributed most frequently we know that at the highest value of €45, the number of businesses contributing decreased.

D10 Profit

Task Sheet 1 'Now you try this' section

- The cumulative frequency table completed:

Marks	<0	<20	<40	<60	<80	<100
Number of students	0	4	14	36	81	106

Now you try this

- The profit made by the 20th business person is approx €1360.
  The profit made by the 25th business person is approx €1450.

  The profit of the 27th business person is €1500 which is €140 more than the profit of the 20th business person.

D11 Soccer

Now you try this

- A first year class in school consists of six students aged 12, five students aged 13 and one student aged 14.

There are 6 students aged 12. Therefore we must multiply 6 by 12 or add 12 together 6 times. The same must be done for each age group.

6 x 12 = 72

15 x 13 = 195

1 x 14 = 14

Add up all the ages: 72 + 196 + 14 = 282

Divide this number by the number of students which is 22. The average age of this group of first years is 12.8.

Now you try this

- The mean, median and mode is calculated based on this information.

Number of people in family	Hourly Rate
1	€7.50
3	€15.00
1	€25
3	€35

Mean:

Calculate all the values together: (7.50) + (3 x 15) + (25) + (2 x 35) = 147.50

This number is then divided by the number of people in the family which is 7. 147.50 divided by 7 is 21.07. The mean hourly rate for this household is €21.07.

Median:

Arrange the data in order:

7.50, 15, 15, 15, 25, 35, 35, 35

The middle number is €15.

Mode:

The mode is €15 and €35 because they both occur three times.

Acknowledgements

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