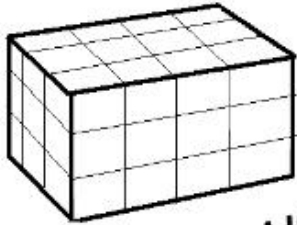
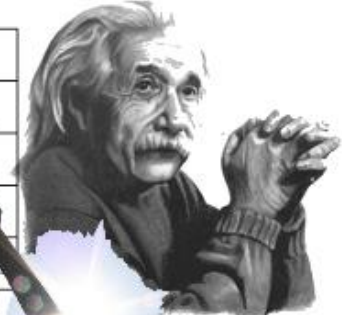
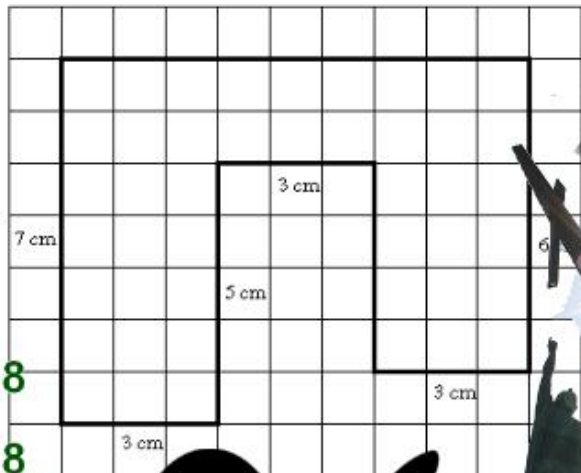


Level 4: Number, Money and Measure



$$1/4 + 1/4 + 1/2$$



Step 1: $6h = 18$

Step 2: $6h = 18$

Step 3: $\cancel{6}h = \frac{18}{\cancel{6}} = 3$

Step 4: $h = 3$



Level 4: Number, Money and Measure

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1. Level 3 Recap

1. Work out the following:

- a) $3.5 + 8.12$ b) $6.2 - 5.98$ c) 303.19×4 d) $127.5 \div 3$

2. Calculate:

- a) 3.43×100 b) 17.24×10 c) $123.1 \div 100$ d) $13.24 \div 1000$
e) 3.21×400 f) 1.85×20 g) $5.6 \div 70$ h) $63.42 \div 70$

3. Round the following to **1 decimal place**:

- a) 0.91 b) 5.92 c) 3.95 d) 5.561

4. Work out the following:

- a) $-10 - 5$ b) $21 - 30$ c) $-8 + 5$ d) $-5 + 7$
e) $14 + (-20)$ f) $(-3) + (-5)$ g) $10 - (-11)$ h) $(-14) - (-12)$
i) $3 \times (-7)$ j) $(-8) \times (-7)$ k) $(-12) \div 6$ l) $(-36) \div (-9)$

5. For the following pairs:

- (i) Write down any common factors,
(ii) Underline the **Highest Common Factor**.
a) 2 and 8 b) 3 and 9 c) 4 and 6 d) 10 and 25
e) 6 and 15 f) 12 and 16 g) 32 and 48 h) 24 and 60

6. List all the prime numbers between 1 and 100.

7. Find the answer **without** using a calculator:

- a) 2^2 b) 4^2 c) 7^2 d) 10^2 e) 12^2
f) 2^3 g) 4^3 h) 1^4 i) 9^1 j) 100^0

8. Work out the following, writing the answer in its simplest form:

- a) $\frac{1}{2} + \frac{1}{3}$ b) $\frac{1}{4} + \frac{1}{8}$ c) $\frac{1}{4} + \frac{1}{5}$ d) $\frac{1}{10} + \frac{2}{5}$
e) $\frac{4}{5} - \frac{1}{25}$ f) $\frac{9}{10} - \frac{1}{5}$ g) $\frac{5}{7} - \frac{3}{8}$ h) $\frac{17}{20} - \frac{14}{25}$

9. Convert the following into **improper fractions**:

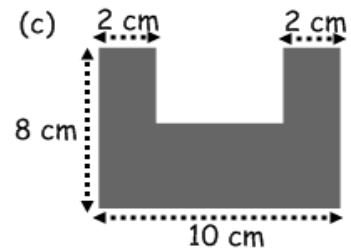
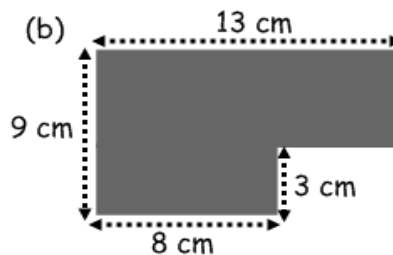
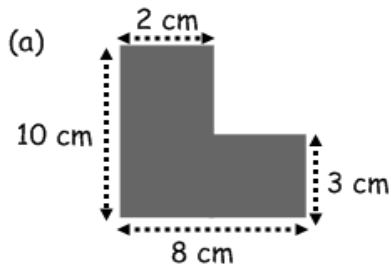
- a) $1\frac{1}{2}$ b) $3\frac{1}{3}$ c) $7\frac{1}{2}$ d) $1\frac{2}{3}$ e) $5\frac{1}{4}$

10. Convert the following into **mixed numbers**:

- a) $\frac{9}{2}$ b) $\frac{14}{3}$ c) $\frac{17}{2}$ d) $\frac{22}{3}$ e) $\frac{19}{4}$

11. Find the cost per item:
- (a) 5 bars of chocolate cost £2.50.
 (b) 3 pens cost 66 pence.
 (c) 8 donuts cost £6.40
12. 6 soldiers have rations for 8 days.
 How many days will the same rations last a squad of 8 soldiers?
13. Usain Bolt ran the 100 metres race in approximately 10 seconds.
 Calculate his approximate average speed.
14. The train from Motherwell to London takes approximately 4 hours. The average speed of the train is 83 miles per hour.
 Calculate the approximate distance between Motherwell and London.
15. The school bus from Shotts to St Aidan's travels 8 kilometres each morning. It has an average speed of 16 kilometres per hour.
 How long does the journey take. Give your answer **minutes**.

16. Calculate the **area** of the following shapes:





17. Find the n^{th} term in each of the following sequences:
- a) 2, 4, 6, 8, ... b) 5, 10, 15, 20, ... c) 5, 9, 13, 17, ... d) 2, 5, 8, 11, ...

18. Simplify the following expressions:
- a) $x + y + x$ b) $7x + 2y - 5x$ c) $21x - 30 + 9x$ d) $18x + 10y - 5y$

19. If $a = 3$, $b = 7$ and $c = 4$, evaluate:
- a) $a + 2b$ b) $4c + 2b$ c) $b - a$ d) $5c - 5a$ e) ab f) $a^2 + c^2$

20. Solve for x :
- a) $2x + 9 = 19$ b) $3x + 5 = 20$ c) $4x + 7 = 35$ d) $10x + 6 = 96$
 e) $4x - 3 = 29$ f) $6x - 5 = 55$ g) $12x - 7 = 29$ h) $7x - 4 = 38$

2. Effect of Rounding on Accuracy (MNU 4-01a)

- Round the following numbers to **1 significant figure**:
a) 4500 b) 6210 c) 99 000 d) 13 e) 468
f) 81 g) 20 980 h) 750 i) 0.09 j) 549
- Round the following numbers to **2 significant figures**:
a) 1280 b) 965 c) 831 d) 105 e) 1.08
f) 5580 g) 32 300 h) 0.011 i) 1.02 j) 0.099
- During the transfer window, Real Madrid bought three players. One player was bought for £12.25 million, another for £32.5 million and the last was bought for £27.75 million.
(a) Round these amounts to **1 significant figure** and add them together to find the approximate amount Real Madrid spent.
(b) Now calculate the accurate amount of money they spent.
How do the accurate amount and approximate amount compare?
- Earth is 149.6 million kilometres from the sun. 
Mars is 227.9 million kilometres from the sun.
(a) Round these amounts to **1 significant figure** and find the distance between Earth and Mars.
(b) Now calculate the accurate distance between the two planets.
How do the accurate amount and approximate amount compare?
- 0.00039 litres of black widow venom can be very dangerous. A black widow can deliver 10 times this amount in a single bite. Calculate the amount of venom a black widow spider can deliver in one bite. Round your answer to **2 significant figures**. 

3. Reasoning and Problem Solving (MNU 4-03a)

1. At lunch time Evan bought two cans of juice and three packets of crisps. He paid £2. John bought two cans of juice and five packets of crisps and this came to £2.60.
(a) How much does a can of juice cost?
(b) How much does a packet of crisps cost?
2. Courtney is having satellite television installed. She wants to pay a maximum of £50 a month. The basic package is £22 a month, however she can add various packages to her subscription:
 - Movies (£11.50 per month)
 - Music (£12 per month)
 - Sports (£18.50 per month)
 - Cartoons (£9.50 per month)
 - Documentaries (£10 per month)List all the possible combinations of packages Courtney can have without spending more than £50 a month.
3. Liam has forgotten his PIN at the bank machine. He knows it contains the numbers 4, 6, 7 and 9. He also remembers it begins with 9.
List all the possibilities for his PIN.
4. The Cassidy family regularly visit the dentist. There are two adults and three children in the Cassidy family. The fees for their dentist are shown below:
Check-Up Fees
Adults £17.50
Children £4.60
If their total fee was £111.40 and they paid for 4 adult check-ups altogether. How many child check-ups did the Cassidy family pay for?

4. Order of Operations (MTH 4-03b)

1. Work out the answers to the following:

(a) $2 + 7 \times 3$ (b) $3 \times 3 - 6$ (c) $4 - 1 \times 3$ (d) $7 \times 7 - 20$

(e) $2 \times 5 + 2 \times 3$ (f) $6 \times 3 - 9 \times 2$ (g) $12 \times 3 - 8 \times 3$ (h) $5 \times 9 - 19 \times 2$

2. Work out the answers to the following:

(a) $3 + 18 \div 3$ (b) $18 \div 3 - 5$ (c) $7 - 21 \div 7$ (d) $50 \div 5 - 8$

(e) $32 \div 8 + 10 \times 3$ (f) $8 \times 3 - 100 \div 10$ (g) $200 \div 10 - 100 \div 50$

3. Work out the answers to the following:

(a) $(7 + 20) \div 9$ (b) $50 \div (27 - 2)$ (c) $(17 - 2) \div 5$ (d) $2 \times (25 - 10)$

(e) $(7 + 4) \times 3$ (f) $9 \times (3 - 1)$ (g) $(40 - 10) \times (3 + 2)$

4. Carry out the following calculations:

(a) $3.4 + 9 \times 2$ (b) $1.3 \times 2 - 2.05$ (c) $14.7 - 2.1 \times 3$ (d) $3 \times 7.1 - 20.5$

(e) $5.9 + 1.12 \times 3$ (f) $6.7 \times 2 - 11.9$ (g) $6.4 \div 8 - 0.35$ (h) $5.7 - 9.1 \div 7$

5. Work out the answers to the following:

(a) $(15 - 9)^2 - 30$ (b) $11 + (3 - 1)^3$ (c) $(12 - 2)^2 - 95$ (d) $2 \times (13 - 11)^2$

(e) $(25 - 22)^3 - (35 - 30)^2$ (f) $(4 + 5)^2 + (19 - 16)^2$

5. Finding Roots (MTH 4-06a)

1. Find the answer without using a calculator:

- a) $\sqrt{25}$ b) $\sqrt{9}$ c) $\sqrt{4}$ d) $\sqrt{49}$ e) $\sqrt{81}$
- f) $\sqrt{36}$ g) $\sqrt{64}$ h) $\sqrt{16}$ i) $\sqrt{1}$ j) $\sqrt{100}$
- k) $\sqrt{169}$ l) $\sqrt{121}$ m) $\sqrt[3]{1}$ n) $\sqrt[3]{8}$ o) $\sqrt[3]{27}$
- p) $\sqrt[3]{64}$ q) $\sqrt[3]{125}$ r) $\sqrt[4]{16}$ s) $\sqrt[4]{81}$ t) $\sqrt[3]{1000}$

2. Calculate the following using a calculator (round your answer to 2 d.p.):

- a) $\sqrt{1985}$ b) $\sqrt{2213}$ c) $\sqrt{766}$ d) $\sqrt{2451}$ e) $\sqrt{10\,950}$
- f) $\sqrt{467}$ g) $\sqrt{7}$ h) $\sqrt{2}$ i) $\sqrt{5}$ j) $\sqrt{21}$
- k) $\sqrt{200}$ l) $\sqrt{500}$ m) $\sqrt[3]{3}$ n) $\sqrt[3]{9}$ o) $\sqrt[3]{22}$
- p) $\sqrt[3]{11}$ q) $\sqrt[3]{100}$ r) $\sqrt[4]{125}$ s) $\sqrt[4]{90}$ t) $\sqrt[3]{144}$



Now try **TRANSFORMERS** and the Mystical Maths Chain!



6. Scientific Notation (MTH 4-06b)

1. Convert the following into scientific notation (standard form):

- a) 100 b) 20 c) 4500 d) 9100
- e) 72 000 f) 125 000 g) 1600 h) 13 500
- i) $2\frac{1}{2}$ million j) 5 billion k) $3\frac{3}{4}$ million l) $10\frac{1}{4}$ million

2. Convert the following into scientific notation (standard form):

- a) 0.1 b) 0.005 c) 0.03 d) 0.0012
- e) 0.00067 f) 0.88 g) 0.0000265 h) 0.0000109

3. Convert the following into normal floating point form:

- a) 1×10^3 b) 4×10^1 c) 6.4×10^3 d) 9.99×10^4
- e) 4.81×10^2 f) 3.125×10^3 g) 3.01×10^4 h) 7.95×10^6
- i) 2.11×10^8 j) 6×10^9 k) 8.76×10^5 l) 1.56×10^9

4. Convert the following into normal floating point form:

- a) 1×10^{-3} b) 3×10^{-1} c) 2.45×10^{-3} d) 3.71×10^{-4}
- e) 1.16×10^{-2} f) 3.14×10^{-3} g) 7.91×10^{-4} h) 3.33×10^{-5}
- i) 6.44×10^{-8} j) 2.16×10^{-9} k) 1.99×10^{-5} l) 2.34×10^{-9}

Now try



Scientific Notation!



7. Calculating Fractions of a Quantity Mentally (MNU 4-07a)

1. Calculate the following **mentally**:

(a) $\frac{1}{4}$ of 24 kg (b) $\frac{1}{2}$ of £60 (c) $\frac{1}{5}$ of 50 cm (d) $\frac{1}{2}$ of £240

(e) $\frac{1}{4}$ of 80 kg (f) $\frac{1}{3}$ of £36 (g) $\frac{1}{6}$ of 78 m (h) $\frac{1}{5}$ of £90

(i) $\frac{1}{7}$ of 140 kg (j) $\frac{1}{3}$ of £180 (k) $\frac{1}{5}$ of 455 cm (l) $\frac{1}{9}$ of 270 cm

(m) $\frac{1}{6}$ of £360 (n) $\frac{1}{10}$ of 1200 kg (o) $\frac{1}{20}$ of 400 m (p) $\frac{1}{11}$ of £99

2. Calculate the following **mentally**:



(a) $\frac{3}{4}$ of £40 (b) $\frac{2}{3}$ of 300 g (c) $\frac{2}{5}$ of 500 cm (d) $\frac{3}{4}$ of £480

(e) $\frac{3}{5}$ of 40 kg (f) $\frac{2}{7}$ of £49 (g) $\frac{5}{6}$ of 66 m (h) $\frac{4}{5}$ of £200

(i) $\frac{3}{7}$ of 70 kg (j) $\frac{2}{3}$ of £180 (k) $\frac{2}{5}$ of 95 cm (l) $\frac{5}{9}$ of 810 cm

(m) $\frac{5}{6}$ of £660 (n) $\frac{7}{10}$ of 400 kg (o) $\frac{11}{20}$ of 100 m (p) $\frac{3}{11}$ of 44 cm

8. Percentage Increase/Decrease (MNU 4-07a)

1. **Increase** £45 by:
(a) 10% (b) 20% (c) 5% (d) 2% (e) 15% (f) 3.5%
2. **Decrease** £160 by:
(a) 10% (b) 20% (c) 5% (d) 2% (e) 15% (f) 3.5%
3. Calculate the following:
(a) **Increase** £17 by 25%. (b) **Increase** £525 by 10%.
(c) **Increase** £235 by 6%. (d) **Increase** £1190 by 2%.
(e) **Decrease** £75 by 5%. (f) **Decrease** £184 by 13%.
(g) **Decrease** £2081 by 9%. (h) **Decrease** £8867 by 14%.
4. Calculate the **percentage profit/loss** in each example:
(a) Keith buys an iPad for £499. He sells it for £350 one year later. Calculate:
(i) His loss, (ii) His percentage loss. 
(b) Sophie spent £20 on a doll 10 years ago. She sells it on eBay for £28. Calculate:
(i) Her profit, (ii) Her percentage profit. 
(c) John's car cost him £1790 five years ago. He has since traded it in for £500.
Calculate:
(i) His loss, (ii) His percentage loss.
(d) Olivia owns a dolls house. Her grandmother bought it for £55 twenty years ago.
It has since **appreciated** in value and is worth £92.
If Olivia sold it what would the percentage profit be?
(e) The value of Rachel's house has **appreciated** from £95 000 to £112 000.
What percentage profit would she make if she sold her house?
(f) Last Christmas Hannah got a new phone. At the time, this phone was worth £95.
It has since **depreciated** in value to £40.
What will her percentage loss be when she trades her phone in?

9. Fraction Operations (MTH 4-07b)

1. Work out the following, writing the answer in its simplest form:

a) $2\frac{1}{3} + 3\frac{1}{2}$ b) $4\frac{1}{5} + 1\frac{2}{3}$ c) $3\frac{3}{4} + 6\frac{1}{3}$ d) $2\frac{7}{10} + 1\frac{2}{5}$

e) $3\frac{4}{5} - 1\frac{1}{10}$ f) $4\frac{2}{3} - 2\frac{1}{4}$ g) $7\frac{5}{6} - 3\frac{2}{3}$ h) $5\frac{7}{9} - 3\frac{1}{5}$

2. Work out the following, writing the answer in its simplest form:

a) $\frac{1}{3} \times \frac{1}{2}$ b) $\frac{1}{5} \times \frac{1}{3}$ c) $\frac{3}{4} \times \frac{1}{2}$ d) $\frac{2}{5} \times \frac{2}{3}$

e) $\frac{4}{5} \times \frac{3}{4}$ f) $\frac{2}{3} \times \frac{1}{10}$ g) $\frac{1}{7} \times \frac{4}{5}$ h) $\frac{6}{11} \times \frac{9}{10}$

i) $3\frac{1}{2} \times 3\frac{1}{2}$ j) $2\frac{1}{2} \times 2\frac{1}{3}$ k) $1\frac{2}{3} \times 2\frac{1}{3}$ l) $3\frac{1}{5} \times 1\frac{1}{4}$

m) $2\frac{1}{2} \times 4\frac{1}{3}$ n) $1\frac{1}{2} \times 10\frac{2}{3}$ o) $2\frac{4}{5} \times 9\frac{9}{10}$ p) $2\frac{1}{7} \times 3\frac{1}{2}$

3. Work out the following, writing the answer in its simplest form:

a) $\frac{1}{3} \div \frac{1}{2}$ b) $\frac{1}{5} \div \frac{1}{3}$ c) $\frac{3}{4} \div \frac{1}{2}$ d) $\frac{2}{5} \div \frac{2}{3}$

e) $\frac{4}{5} \div \frac{3}{4}$ f) $\frac{2}{3} \div \frac{1}{10}$ g) $\frac{1}{7} \div \frac{4}{5}$ h) $\frac{6}{11} \div \frac{9}{10}$

i) $1\frac{1}{3} \div 2\frac{1}{4}$ j) $5\frac{1}{2} \div 2\frac{2}{3}$ k) $7\frac{1}{4} \div 2\frac{3}{4}$ l) $1\frac{3}{5} \div 2\frac{1}{3}$

m) $3\frac{1}{5} \div 2\frac{1}{2}$ n) $1\frac{1}{5} \div 3\frac{2}{3}$ o) $1\frac{4}{5} \div 2\frac{1}{3}$ p) $3\frac{1}{2} \div 2\frac{3}{4}$

Now try

**STAR
WARS**

Episode II²/₃: The Fractions Strike Back!



10. Ratio Calculations (MNU 4-08a)

1. Simplify the following ratios:

- (a) 15:5 (b) 4:12 (c) 3:18 (d) 9:36 (e) 4:14 (f) 6:15 (g) 15:35
(h) 24:40 (i) 18:12 (j) 21:49 (k) 28:56 (l) 15:75 (m) 54:27 (n) 90:45

2. Simplify the following to **unitary ratios**:

- (a) $\frac{1}{3}:2$ (b) $\frac{1}{4}:3$ (c) $\frac{1}{2}:7$ (d) $\frac{1}{5}:20$ (e) $\frac{1}{9}:11$ (f) $\frac{1}{2}:\frac{1}{4}$ (g) $\frac{1}{2}:\frac{1}{8}$

3. Write each of the following in its **simplest form**:


- (a) $\frac{2}{3}:5$ (b) $\frac{3}{4}:7$ (c) $\frac{2}{5}:4$ (d) $\frac{3}{5}:3$ (e) $\frac{3}{4}:9$ (f) $\frac{1}{2}:\frac{3}{4}$ (g) $\frac{1}{2}:\frac{2}{3}$

4. Write each of the following in its **simplest form**:

- (a) 10 cm : 2 m (b) 300 g : 1 kg (c) 5 litres : 900 ml (d) 3.5 m : 25 cm
(e) 650 g : 13 kg (f) 420 ml : 7 litres (g) 35 cm : 5.6 m (h) $\frac{1}{5}$ kg : 75 g

5. Share £420 in the ratios:

- (a) 3:4 (b) 1:2 (c) 2:3 (d) 9:1 (e) 5:2 (f) 1:5

6. Fiona and Marie are going to the cinema. The tickets, popcorn and juice altogether costs £18.20. Fiona and Marie split the cost in a ratio of 2:3. How much does each person pay? 

7. Paul and Raymond share a flat. Their utilities bill comes to £640 each month. Paul and Raymond split the cost of the bill in the ratio 5:3. How much does Paul contribute to utilities each month?

8. In a class the ratio of girls to boys is 3:1. If there are 21 girls, how many pupils are in the class altogether?

9. In John's film collection, the ratio of DVDs to Blu-Rays is 4:3. If he has 126 DVDs, how many Blu-Rays does he have?

10. A model train has a scale of 1:300.

(a) If the length of the train is 120 metres, how long is the model?

(c) If the model has a compartment length of 5 cm, how long are the compartments on a real train?



Now try



Ratios!



11. Managing a Record Label (MNU 4-09a)

You must now manage the finances of your own record label:

- 1) Organise yourselves into groups of 3.
- 2) As a group you must create a mathematical sounding name for your record label and design a logo.
- 3) You have a starting budget of £150 million.
(Keep all units in millions)
- 4) You have the option to borrow more money from the following:

Fraction Loans - Borrow £50 million and make monthly payments of £4.5 million for 12 months.

BANK OF PYTHAGORAS - Take a loan of £75 million and make 11 monthly payments of £6.95 million.

Fibonacci Finances - Have a credit card with a limit of £100 million.

At the end of the year pay back any money borrowed plus 21% APR.

- 5) You must now buy six artists and total their Pop, Indie, Rock and R&B ratings.
- 6) You must pay for a world tour.
- 7) Keep your balance up to date as you work through a financial year.
- 8) The team with the most money wins!



12. Visiting a Theme Park (MNU 4-10a)

As a class you must now create your very own Theme Park!

- 1) Organise yourselves into groups of 3.
- 2) As a group you are responsible for creating one world for your class theme park.
- 3) Each world must have 4 rides:
 - **** rides are the fastest.
 - *** rides are very fast.
 - ** rides are quite fast.
 - * rides are for young children, elderly people, etc.
- 4) Minimum queuing time for any ride must be 15 minutes, however the faster the ride, the longer the queuing time.
Each ride must also state the time each ride lasts.
- 5) Decide as a class which country you wish to base your theme park in. Each world may then take on its own theme.
- 6) Each world must have a restaurant. Restaurant prices must be in both Pounds Sterling and the foreign currency of your chosen country.
- 7) Once your Theme Park is ready, manage your time around the park and visit as much as you can between the opening and closing time.



13. Decimal Time (MNU 4-10b)

1. Change the following into **decimal hours**:

- | | | |
|------------------------|------------------------|------------------------|
| (a) 30 minutes | (b) 15 minutes | (c) 20 minutes |
| (d) 45 minutes | (e) 18 minutes | (f) 54 minutes |
| (g) 1 hour 5 minutes | (h) 1 hour 35 minutes | (i) 1 hour 50 minutes |
| (j) 2 hours 24 minutes | (k) 2 hours 45 minutes | (l) 3 hours 10 minutes |
| (m) 5 hours 6 minutes | (n) 7 hours 15 minutes | (o) 2 hours 40 minutes |

2. Change the following into **hours and minutes**:

- | | | |
|-----------------|-----------------|----------------|
| (a) 0.25 hours | (b) 0.75 hours | (c) 0.33 hours |
| (d) 0.5 hours | (e) 0.15 hours | (f) 0.4 hours |
| (g) 1.1 hours | (h) 1.6 hours | (i) 1.67 hours |
| (j) 2.5 hours | (k) 3.9 hours | (l) 5.35 hours |
| (m) 10.75 hours | (n) 20.24 hours | (o) 15.8 hours |

14. Speed, Distance & Time Calculations (MNU 4-10b)

1. Calculate missing component: Distance, Speed or Time?

(a) **Distance** = ? km
Average Speed = 50 km/hr
Time = 2 hours 30 minutes

(b) **Distance** = 122 km
Average Speed = 45 km/hr
Time = ? hours ? minutes

(c) **Distance** = 255 km
Average Speed = ? km/hr
Time = 3 hours 40 minutes

(d) **Distance** = ? miles
Average Speed = 60 mph
Time = 4 hours 19 minutes

(e) **Distance** = 55 miles
Average Speed = 45 mph
Time = ? hours ? minutes

(f) **Distance** = 520 miles
Average Speed = ? mph
Time = 7 hours 35 minutes

(g) **Distance** = 200 metres
Average Speed = 8 ms⁻¹
Time = ? seconds

(h) **Distance** = ? km
Average Speed = 90 km/hr
Time = 3 hours 14 minutes

(i) **Distance** = ? metres
Average Speed = 10 ms⁻¹
Time = 11.5 seconds

(j) **Distance** = 94 miles
Average Speed = ? mph
Time = 1 hour 50 minutes

(k) **Distance** = 149 miles
Average Speed = 55 mph
Time = ? hours ? minutes

(l) **Distance** = 475 km
Average Speed = ? km/hr
Time = 3 hours 21 minutes




(m) **Distance** = ? miles
Average Speed = 75 mph
Time = 1 hour 45 minutes

(n) **Distance** = ? km
Average Speed = 35 km/hr
Time = 39 minutes

(o) **Distance** = 78 miles
Average Speed = ? mph
Time = 1 hour 3 minutes

(p) **Distance** = 270 miles
Average Speed = 48 mph
Time = ? hours ? minutes

14. Speed, Distance & Time Calculations (MNU 4-10b)

2. A train is travelling across Europe.
It is travelling at an average speed of 91 miles per hour.
The train terminates after a journey time of 7 hours and 51 minutes.
How far has the train travelled?
3. The Flash runs 39 miles in 14 minutes.
What is the Flash's average speed?

4. A footballer covers a distance of 10 720 metres in a 94 minutes football match.
What is his average speed in metres per second?

5. A hurdler in the Olympics is travelling at an average speed of 12 metres per second. How long does it take her to complete a 200 metre race?
6. A tennis player delivers his serve. It travels at 110 kilometres per hour over 24 metres. How many seconds does his opponent have to return the ball?

7. A car is driven for 3 hours and 35 minutes at an average speed of 44 miles per hour.
How far has the car travelled?

Now try



Speed, Distance or Time?



15. Accuracy in Measurement (MNU 4-11a)

The importance of being accurate when making measurements is crucial to many areas of everyday life.

Your task is to measure the dimensions of any room in your house. Be as accurate as you can!

Now calculate how much flooring or carpet you would need to cover the floor. Also how much paint or wallpaper you would need to cover the walls.

Now you have your accurate costs, change some of the dimensions and make new calculations.

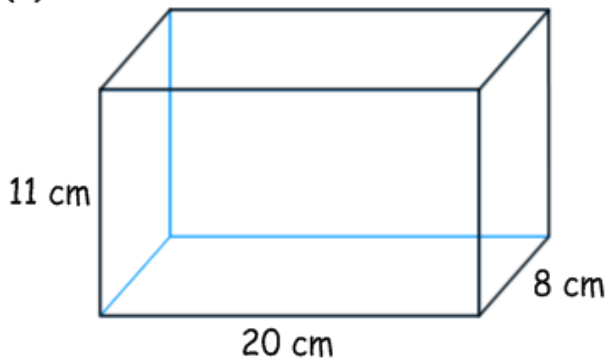
How much does this inaccuracy affect the amount of materials you need?



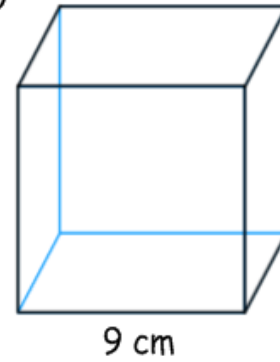
16. Surface Area (MTH 4-11b)

Calculate the surface area of each shape:

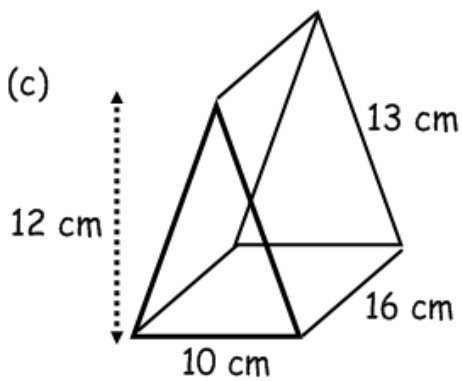
(a)



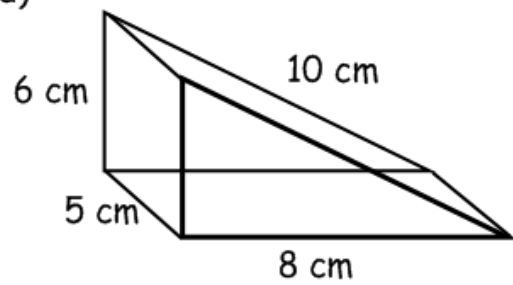
(b)



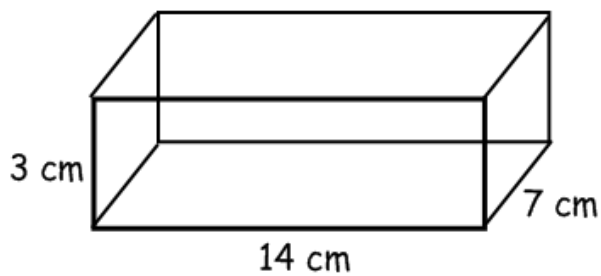
(c)



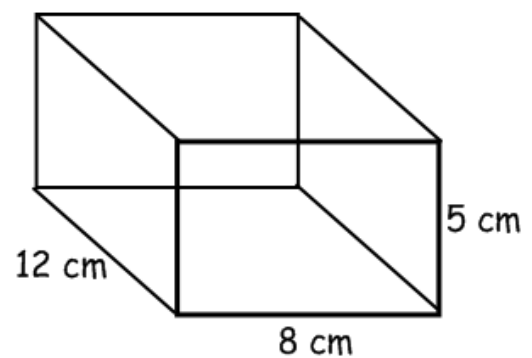
(d)



(e)

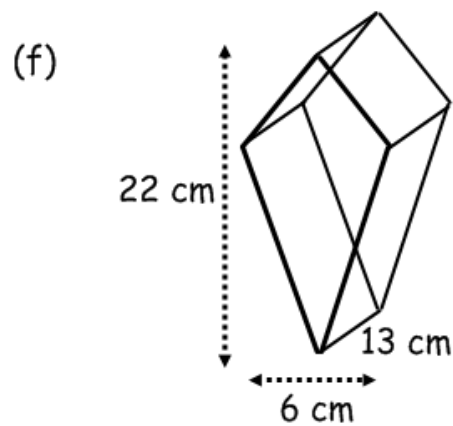
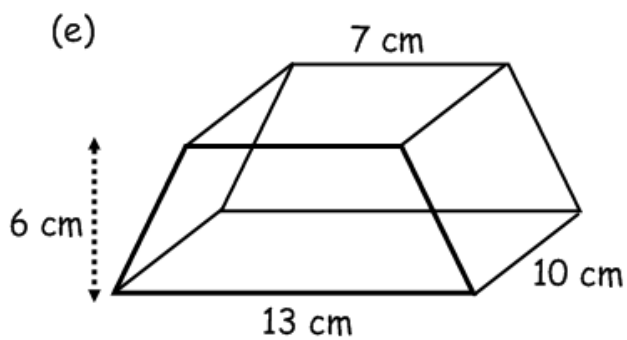
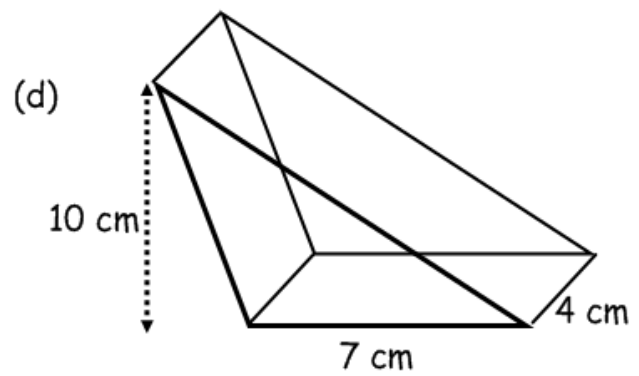
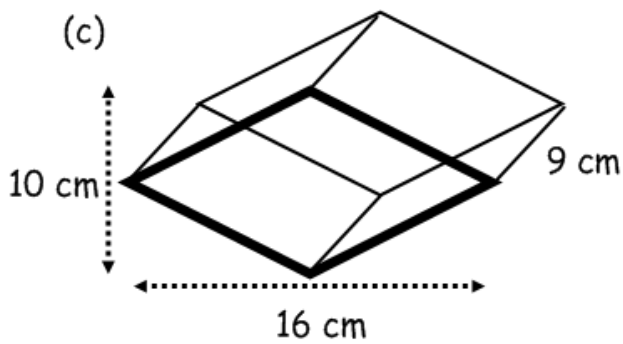
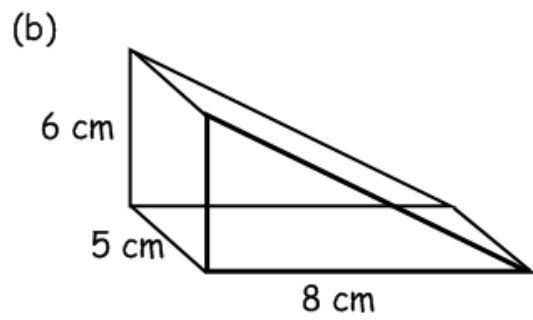
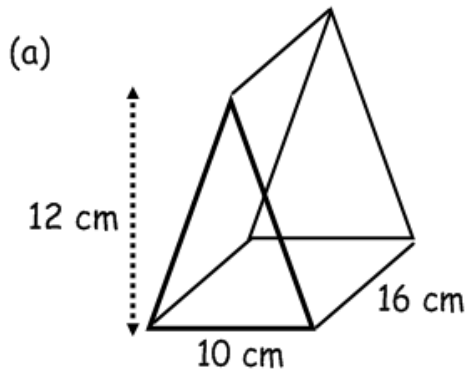


(f)



17. Volume of a Prism (MTH 4-11c)

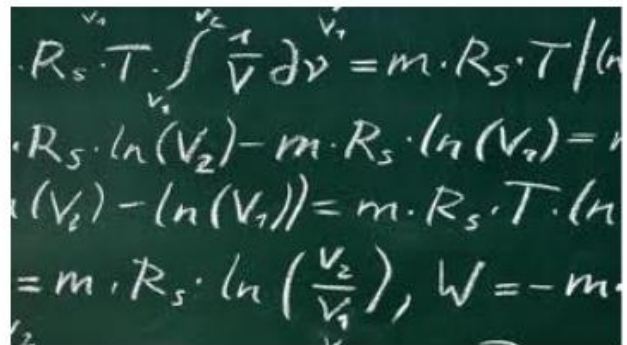
Calculate the **volume** of each prism:



18. Mathematical Careers (MTH 4-12a)

In pairs you must research a mathematical career from the wide range of possibilities available to you.

Together, you must prepare a report on your chosen career and present your findings to the rest of your class.



Actuarial Mathematics

Applied Mathematics

Biomathematics

Biostatistics and Epidemiology

Computer Science

Financial Mathematics

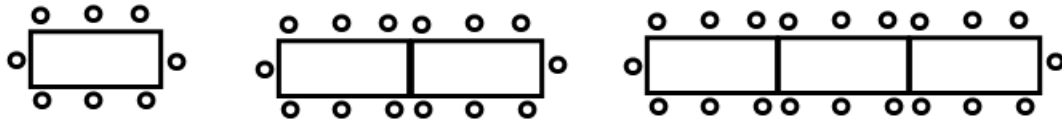
Research Mathematics

Teaching

Technical Writing



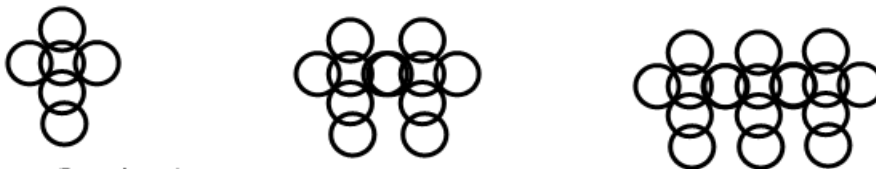
19. Linear Patterns from Pictures (MTH 4-13a)



1. For the above pictures:
(a) Complete the table

Number of Rectangles (R)	1	2	3	4	5	6
Number of Circles (C)	8	14				

- (b) Write down a formula connecting the number of rectangles (R) and the number of circles (C).
(c) If there were 20 rectangles, how many circles would there be?
(d) If there were 62 circles, how many rectangles would there be?



2. For the above pictures:
(a) Complete the table

Number of Crosses (C)	1	2	3	4	5	6
Number of Hoops (H)	6	11				

- (b) Write down a formula connecting the number of crosses (C) and the number of hoops (H).
(c) If there were 9 crosses, how many hoops would there be?
(d) If there were 56 hoops, how many crosses would there be?



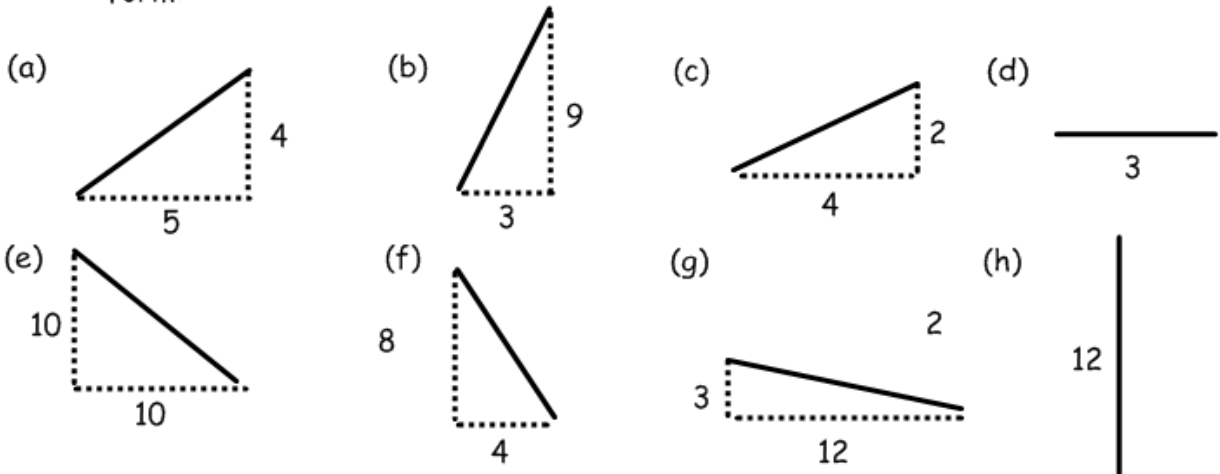
3. For the above pictures:
(a) Complete the table

Number of Stars (S)	1	2	3	4	5	6
Number of Circles (C)	5	7				

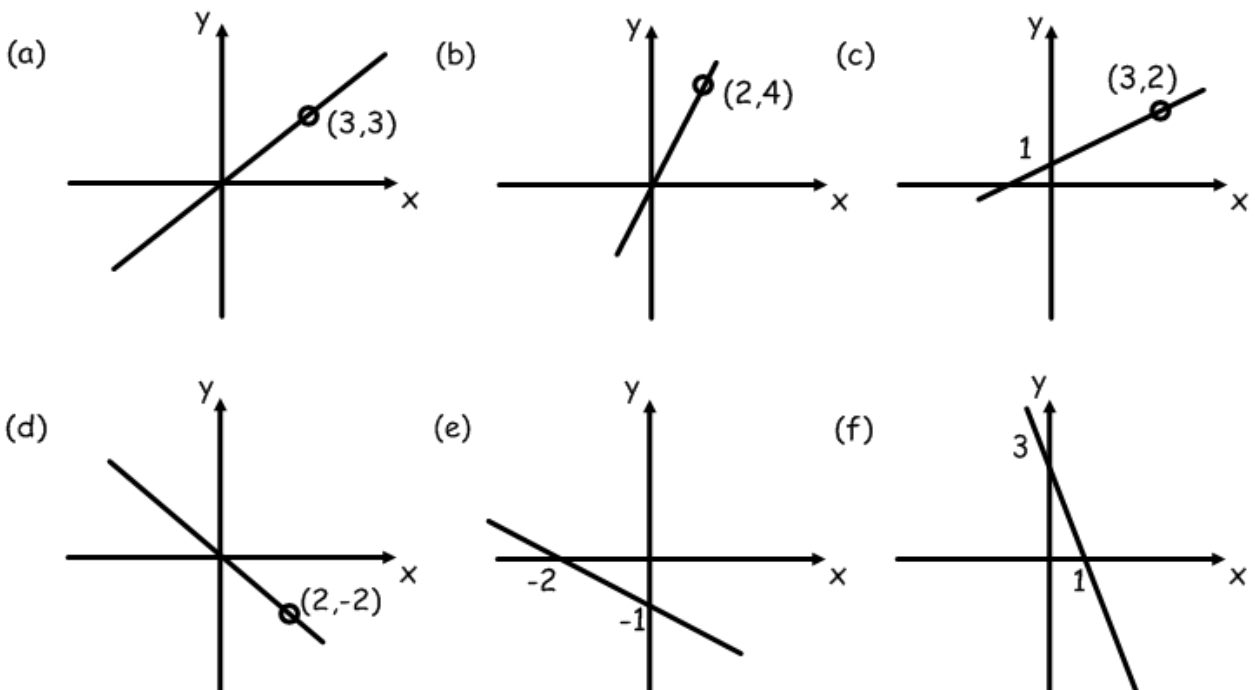
- (b) Write down a formula connecting the number of Star (S) and the number of circles (C).
(c) If there were 10 stars, how many circles would there be?
(d) If there were 33 circles, how many stars would there be?

20. Calculating Gradient (MTH 3-13b)

1. Calculate the gradients of the following lines writing your answer in its simplest form:

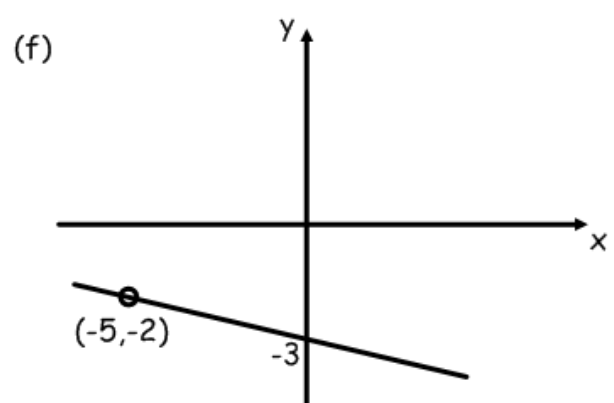
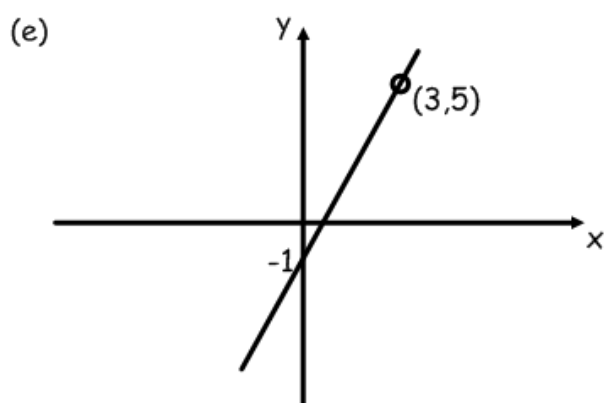
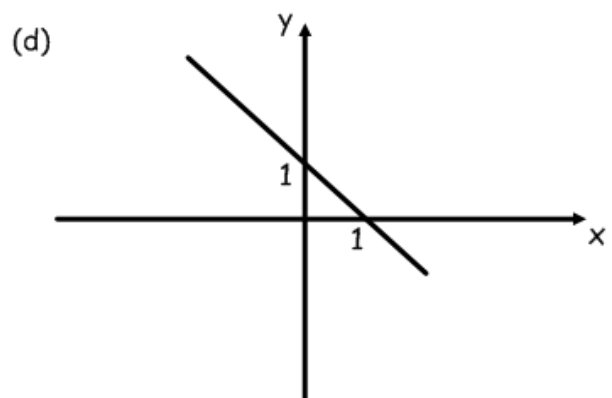
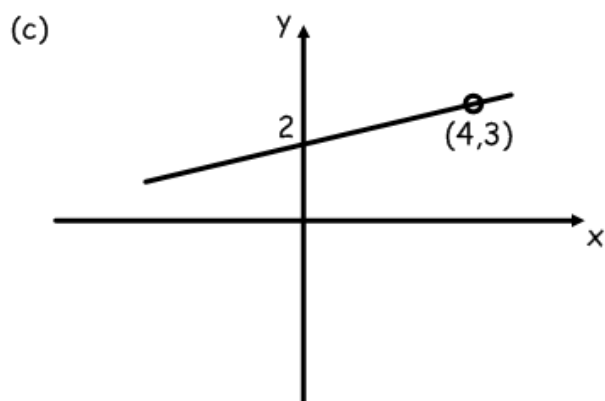
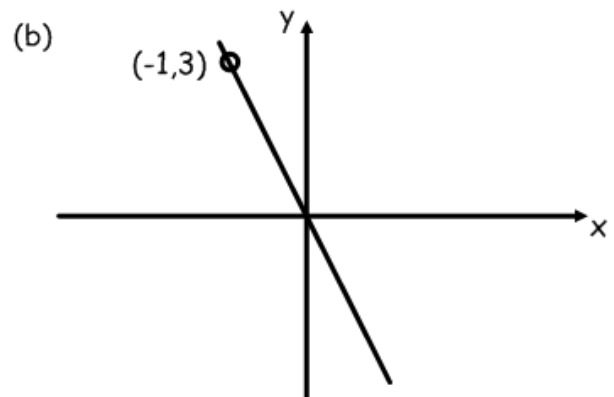
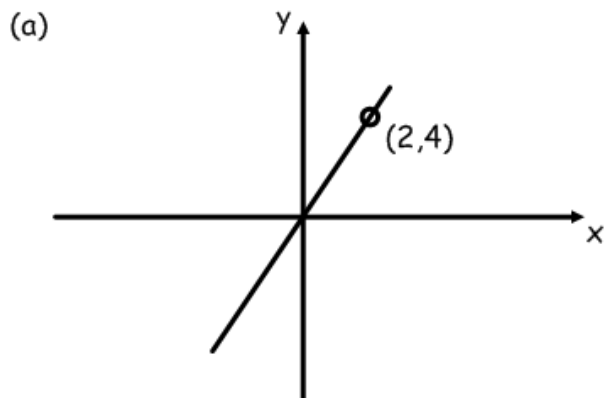


2. Use the coordinates to calculate the gradient of each straight line:



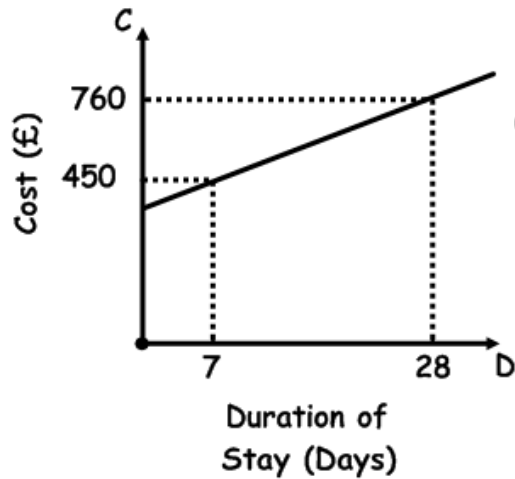
21. The Equation of a Straight Line (MTH 4-13b)

Find the equation of the straight line for each of the following:



23. Using the Equation of a Straight Line (MTH 4-13d)

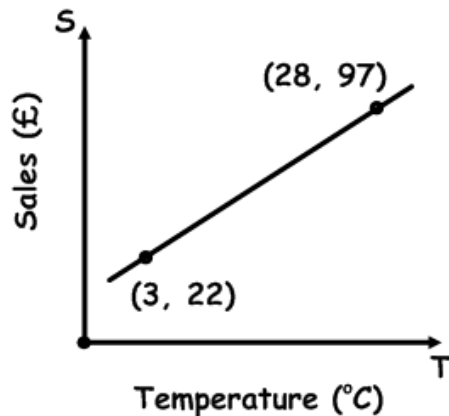
1. The graph shows how the cost of a holiday is affected by the duration of the stay:



(a) Find the equation of the straight line.

(b) How much would it cost for a 14 day holiday?

2. The straight line shows the relationship between ice cream sales and temperature:



(a) Find the equation of the straight line.

(b) How much would sales be if the temperature was 20°C ?

24. Breaking Brackets (MTH 4-14a)

1. Remove the brackets:

(a) $2(a + 2)$

(b) $3(b - 1)$

(c) $2(c + 9)$

(d) $4(d - 5)$

(e) $5(1 + e)$

(f) $4(2 - f)$

(g) $2(2g + 9)$

(h) $2(3h - 5)$

(i) $4(5i + 3)$

(j) $2(10 - 3j)$

(k) $5(8 + 6k)$

(l) $10(1 - 4l)$

(m) $7(4m + 5n)$

(n) $3(6m - 7n)$

(o) $o(o + 1)$

(p) $p(p - q)$

(q) $q(2p + q)$

(r) $3r(r - 2)$

(s) $4s(s + 3)$

(t) $2t(7 - 2t)$

(u) $3u(4 + 5u)$

(v) $3(u + 2v + w)$

(w) $w(2u + 3v + 5w)$

(x) $2x(2x + 5y - 9z)$

2. Remove the brackets and simplify:

(a) $2(a + 2) + 3(a - 1)$

(b) $3(b + 3) + (b + 7)$

(c) $3(c + 1) + 4(2 + c)$

(d) $5(3 + d) - 3(d + 1)$

(e) $4(e - 2) - 3(e - 4)$

(f) $5(f + 7) + 2(3f - 2)$

(g) $2(4g + 5) - 3(g - 2)$

(h) $7(1 + 2d) - 4(3d + 2)$

(i) $2(8 - 2i) - 4(3 - i)$

(j) $-3(j - 2) - 3(2j - 8)$

(k) $4(3k - 8) + 6(3 - 2k)$

(l) $3(4l - 3k) + 4(5l + k)$

25. Factorising (MTH 4-14b)

1. By removing the **Highest Common Factor**, factorise:

(a) $3a + 9$

(b) $2b - 18$

(c) $5c - 35$

(d) $4d + 14$

(e) $10e - 2$

(f) $3f - 18$

(g) $10g + 15$

(h) $9 - 3h$

(i) $14 + 21i$

(j) $22 - 11j$

(k) $40 + 25k$

(l) $24l - 30$

(m) $3m^2 + m$

(n) $5n - n^2$

(o) $o^2 - o$

(p) $pq - p$

(q) $q^2 + pq$

(r) $r^2 - 14r$

(s) $4s^2 + 12s$

(t) $5t^2 - 25t$

(u) $8u + u^2$

(v) $2vw^2 + v^2w$

(w) $3uw^2 + 9uw$

(x) $2xy + y^2$

2. Factorise (**extension**):

(a) $x^2 - y^2$

(b) $x^2 - 1$

(c) $x^2 - 9$

(d) $16 - y^2$

(e) $25 - y^2$

(f) $9x^2 - 25$

(g) $100x^2 - 49$

(h) $9x^2 - 64y^2$

(i) $25x^2 - 36y^2$

26. Solving Inequalities (MTH 4-15a)

1. Solve the following inequations:

a) $x + 3 > 9$ b) $7 + x < 12$ c) $x + 12 > 19$ d) $22 + x < 30$

e) $x - 7 < 3$ f) $x - 5 > 15$ g) $19 - x < 10$ h) $28 - x > 8$

i) $x + 40 \leq 52$ j) $x + 35 \geq 70$ k) $x - 88 \geq 2$ l) $67 - x \leq 27$

2. Solve for x :

a) $2x \geq 20$ b) $5x \leq 45$ c) $6x \geq 36$ d) $3x \geq 30$

e) $4x \leq 32$ f) $10x \geq 70$ g) $11x > 99$ h) $7x < 82$

i) $x \div 3 > 4$ j) $x \div 2 < 12$ k) $15 \div x < 3$ l) $55 \div x > 11$

3. Solve for x :

a) $2x + 9 < 19$ b) $3x + 5 > 20$ c) $4x + 7 \leq 35$ d) $10x + 6 \geq 96$

e) $4x - 3 \leq 29$ f) $6x - 5 \geq 55$ g) $12x - 7 \leq 29$ h) $7x - 4 \geq 38$

i) $2 + 3x < 11$ j) $6 + 5x > 41$ k) $9 - 4x > 13$ l) $16 - 2x < 6$

m) $3x - 2 \leq x + 11$ n) $5x + 9 \leq 37 - x$

o) $12 + 7x < 2x + 47$ p) $9 - 3x > 3x + 45$



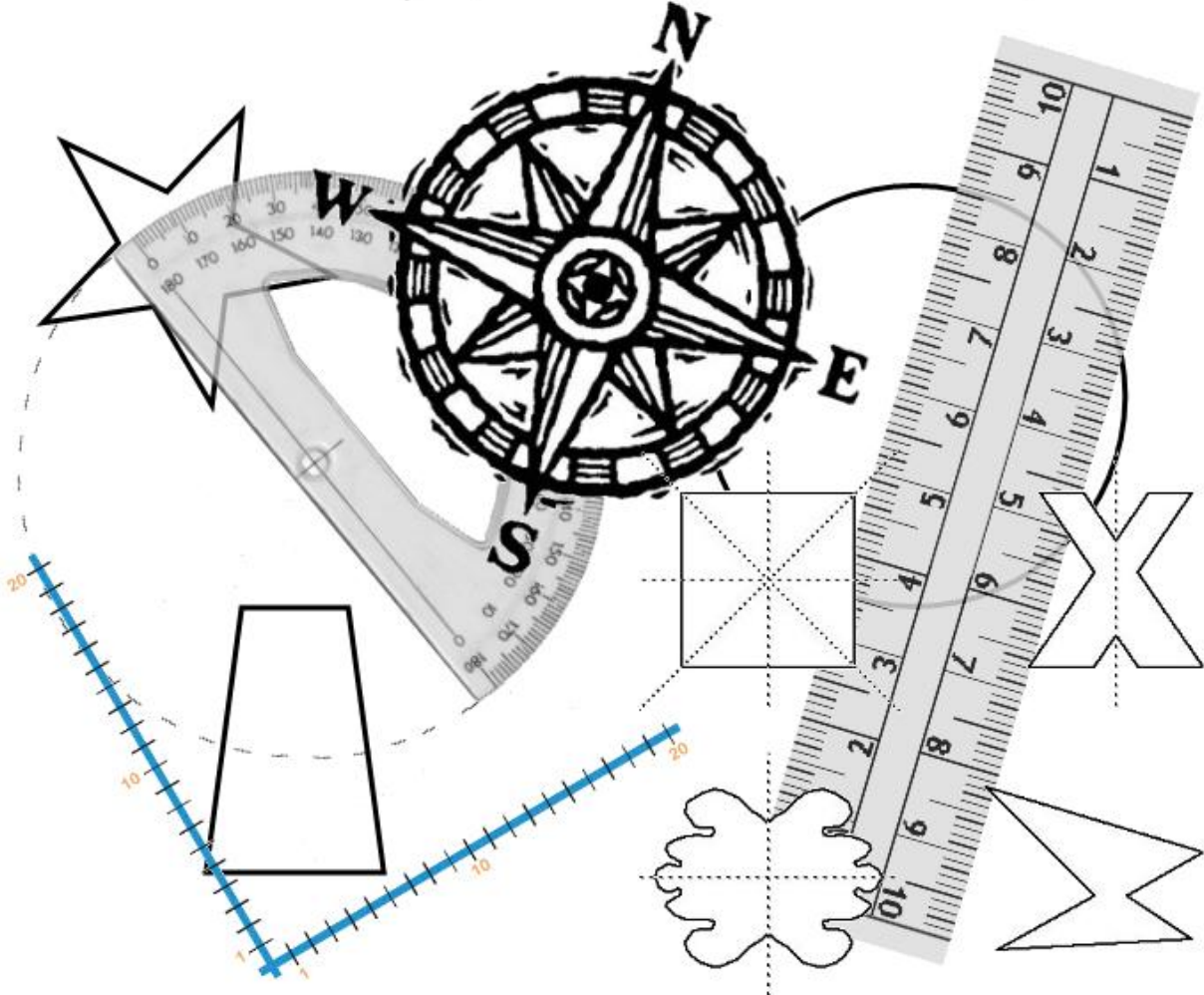
Now try

X-MEN

Algebra!



Level 4: Shape, Position and Movement



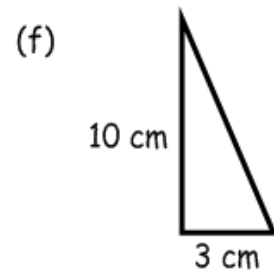
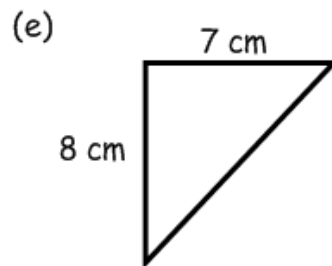
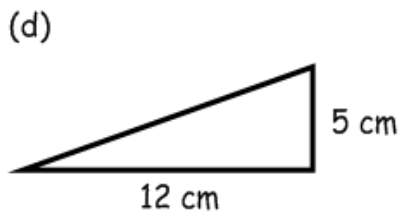
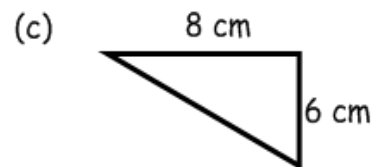
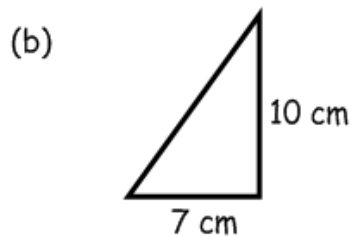
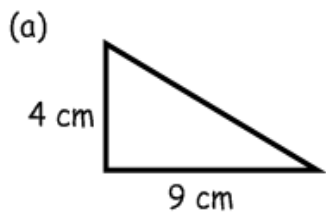
Level 4: Shape, Position and Movement

Contents

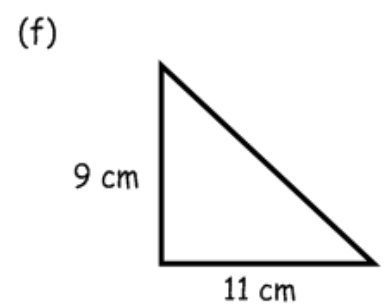
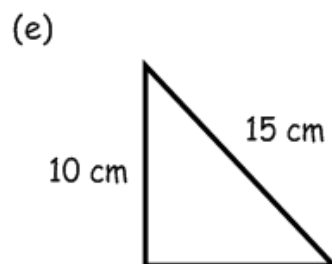
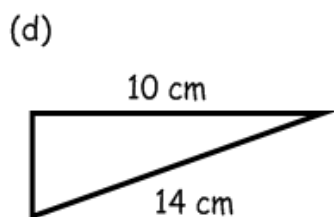
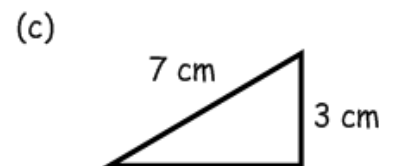
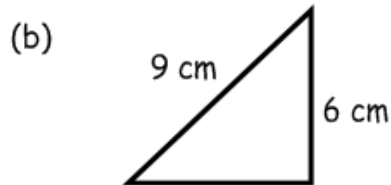
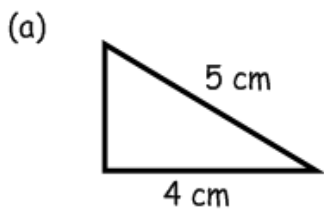
27. Pythagoras (MTH 4-16a)
28. Introduction to Trigonometry (MTH 4-16a)
29. The Circle (MTH 4-16b)
30. Arcs & Sectors (MTH 4-16b)
31. Tangent to a Circle (MTH 4-17a)
32. Similarity (MTH 4-17b)
33. 4 Quadrant Coordinates (MTH 4-18a)
34. Shapes on a Coordinate Grid (MTH 4-18b)
35. Rotational Symmetry (MTH 4-19a)
36. Translation Symmetry (MTH 4-19a)

27. Pythagoras (MTH 4-16a)

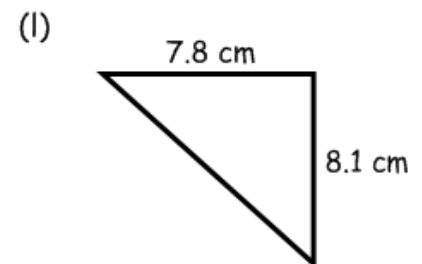
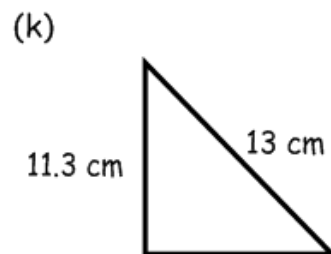
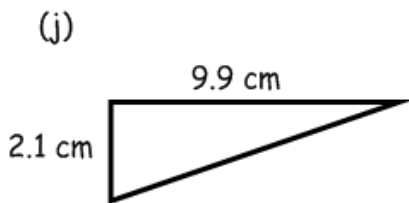
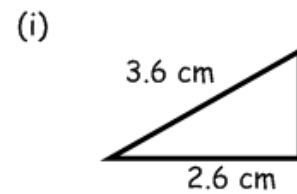
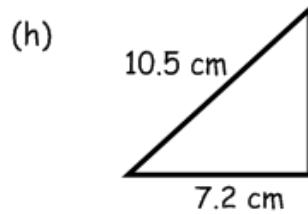
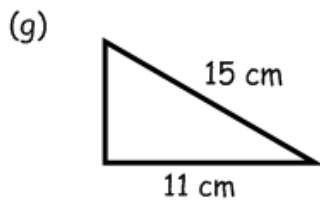
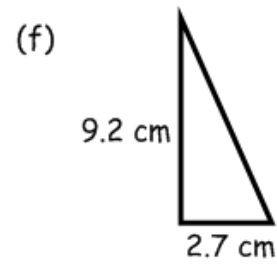
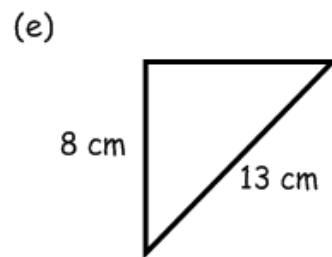
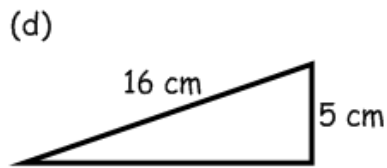
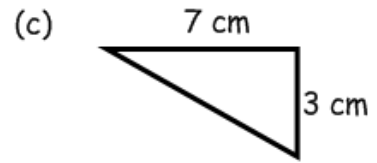
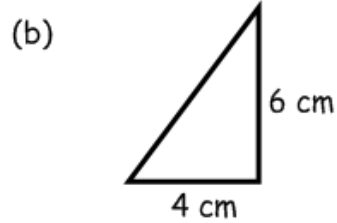
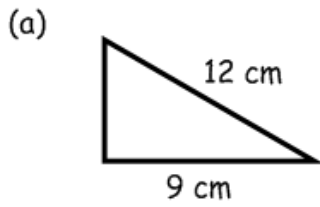
1. Calculate the missing side in each triangle:



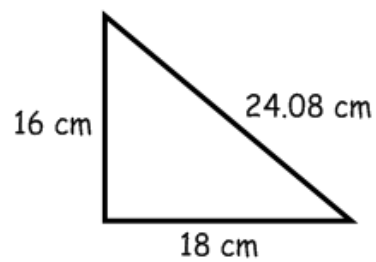
2. Calculate the missing side in each triangle:



3. Calculate the missing side in each triangle:



4. Is the triangle below right-angled?

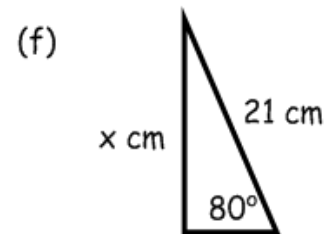
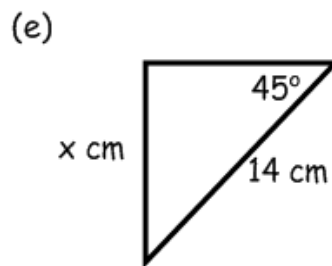
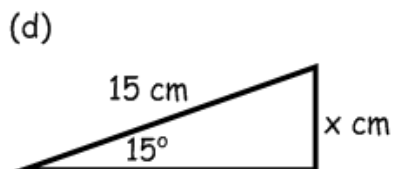
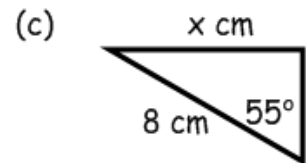
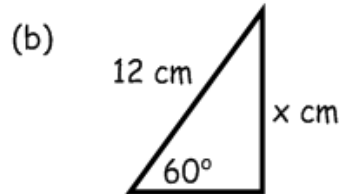
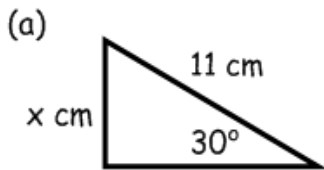


Justify your answer.

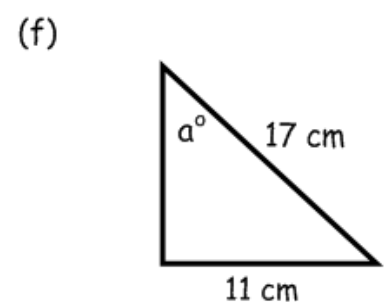
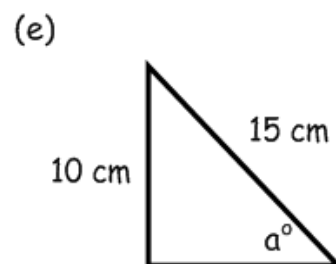
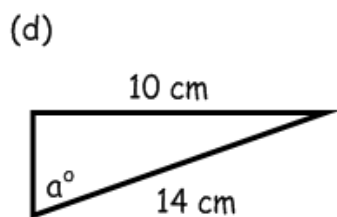
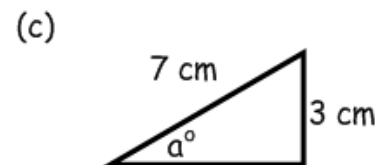
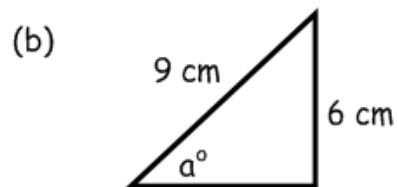
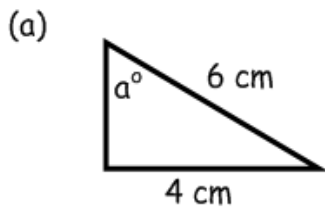
28. Introduction to Trigonometry (MTH 4-16a)

Sin Ratio

1. Calculate the size of side x in each triangle:

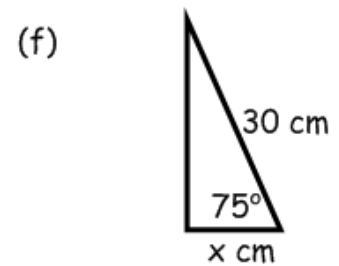
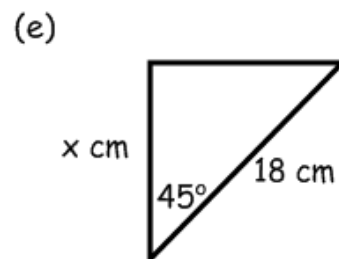
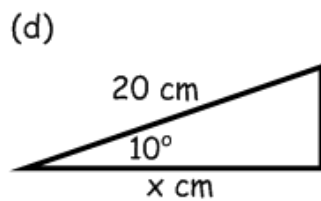
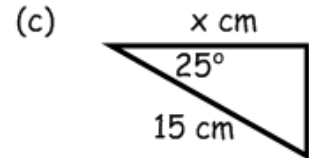
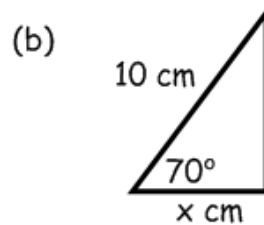
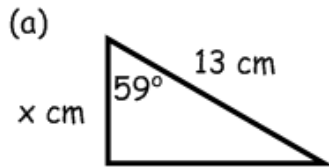


2. Calculate the size of the missing angle in each:

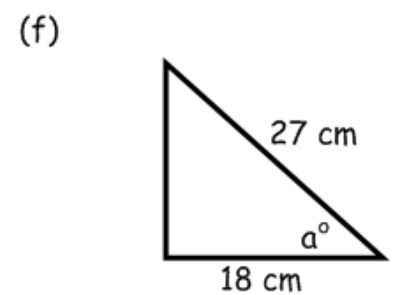
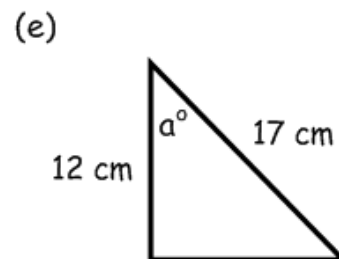
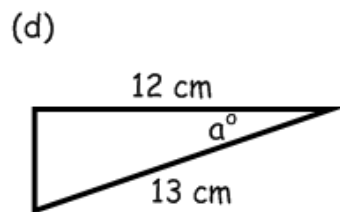
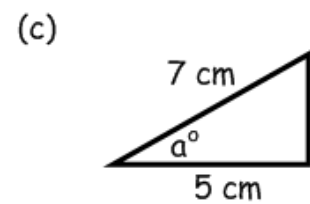
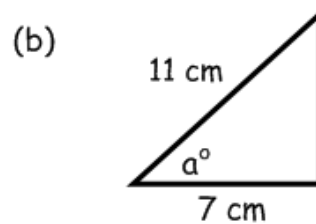
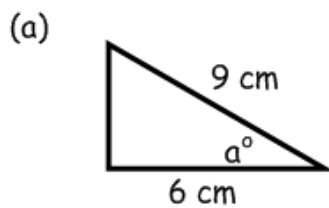


Cos Ratio

3. Calculate the size of side x in each triangle:

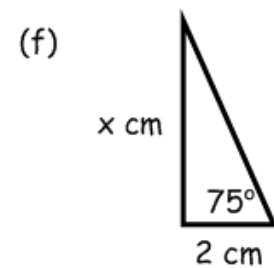
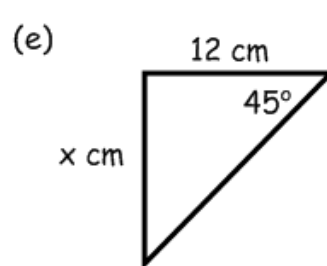
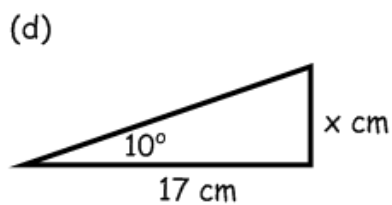
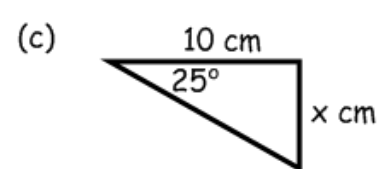
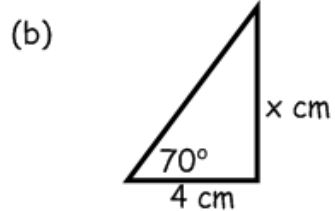
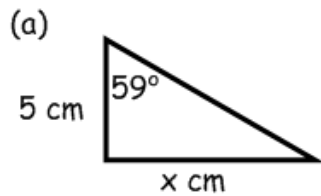


4. Calculate the size of the missing angle in each triangle:

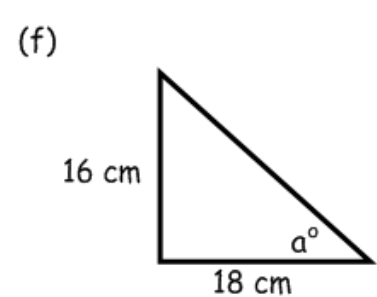
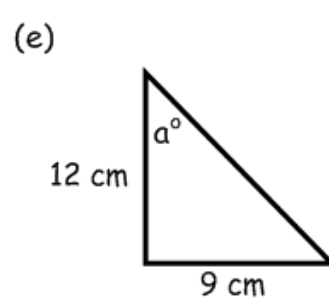
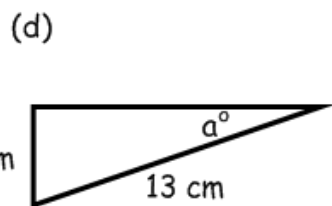
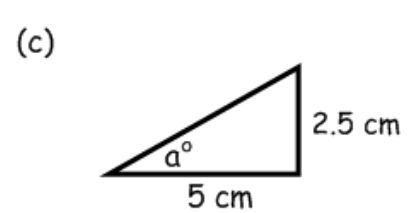
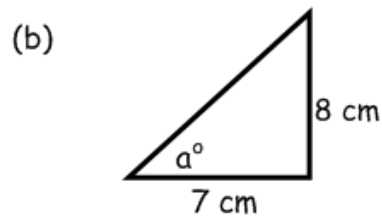
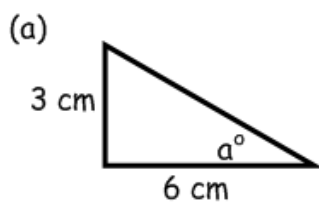


Tan Ratio

5. Calculate the size of side x in each triangle:

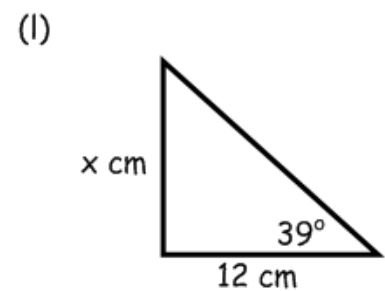
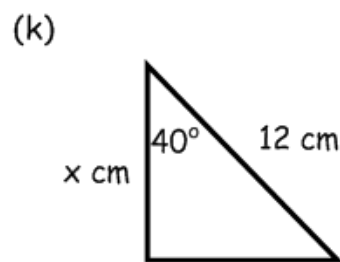
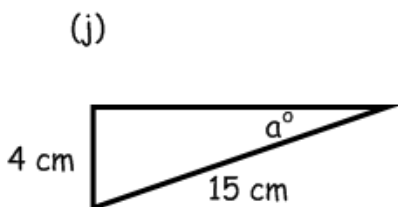
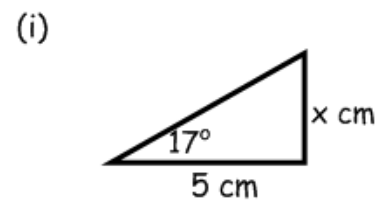
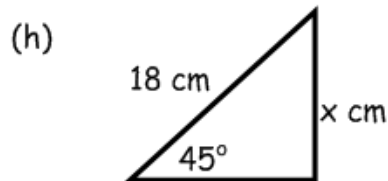
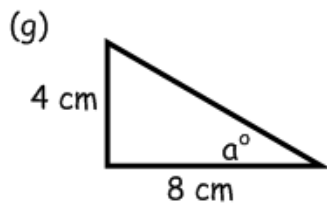
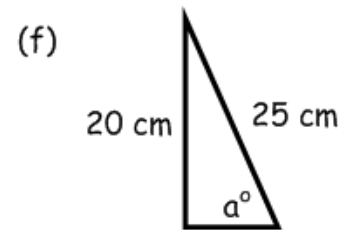
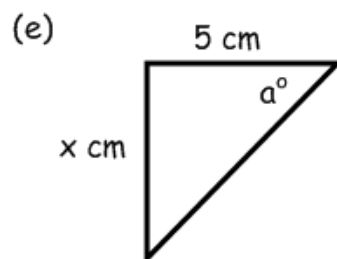
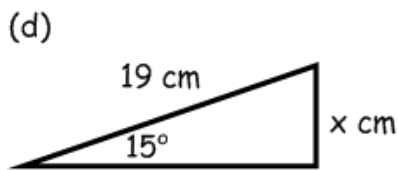
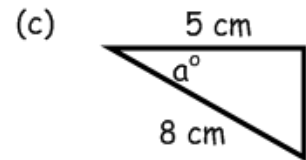
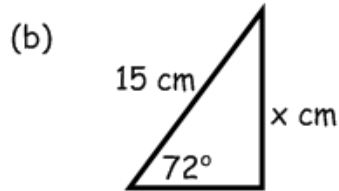
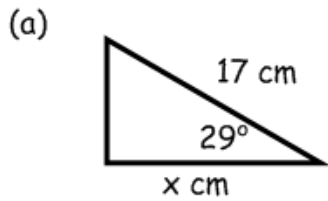


6. Calculate the size of the missing angle in each triangle:



SOH/CAH/TOA

7. Calculate either side x or angle a° in each triangle:



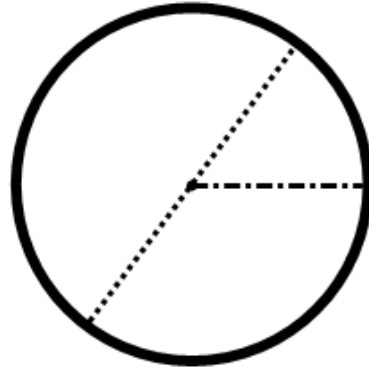
Now try...

STAR TRIG

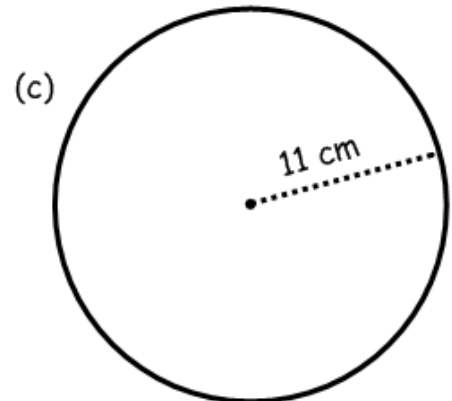
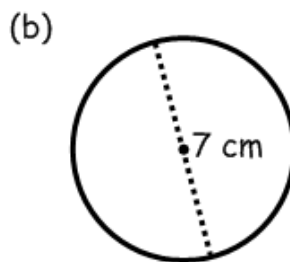
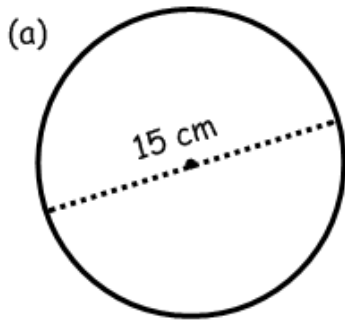


29. The Circle (MTH 4-16b)

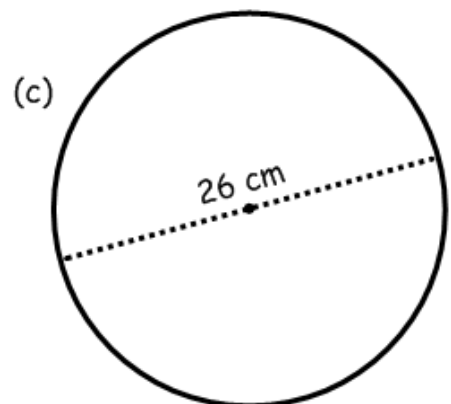
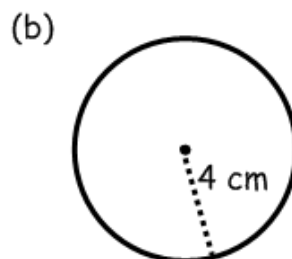
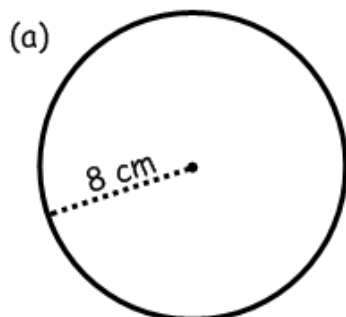
1. Name each part of the circle:
2. What is the radius of a circle with diameter 48 centimetres?
3. What is the diameter of a circle with radius 13 centimetres?



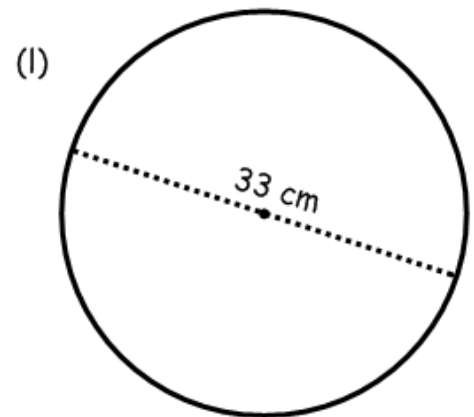
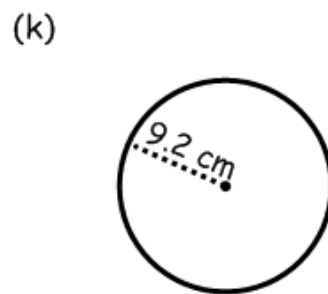
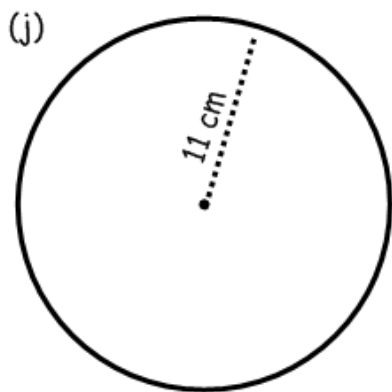
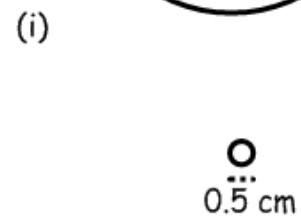
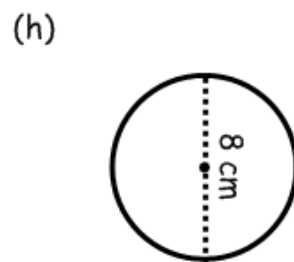
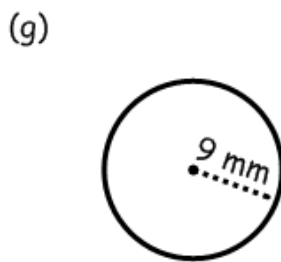
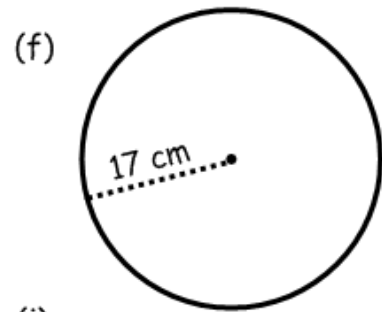
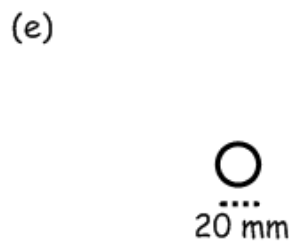
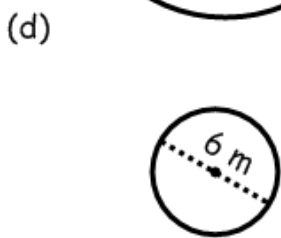
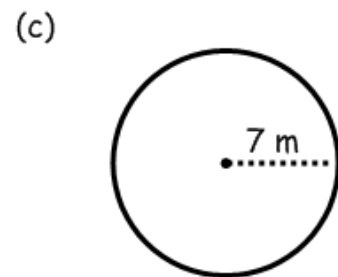
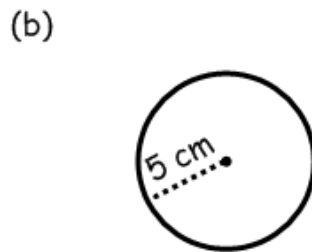
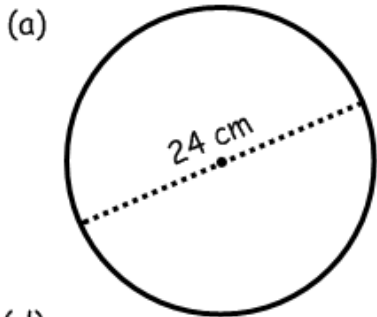
4. Calculate the **circumference** of each circle:



5. A circle has a circumference of 46 centimetres. What is its diameter?
6. A circle has a circumference of 62 centimetres. What is its radius?
7. Calculate the **area** of each circle:

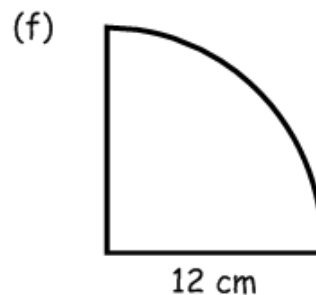
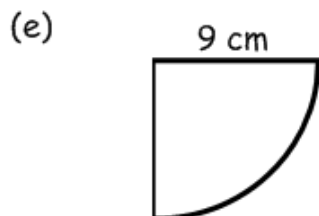
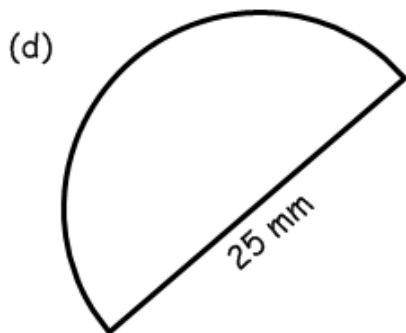
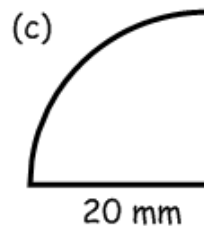
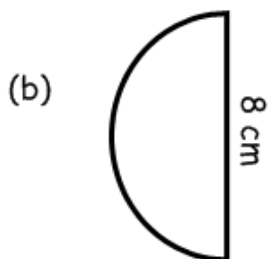
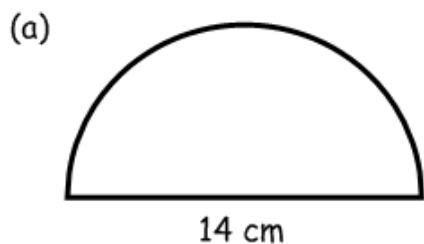


8. Calculate the **area** and the **circumference** of each circle:



30. Arcs & Sectors (MTH 4-16b)

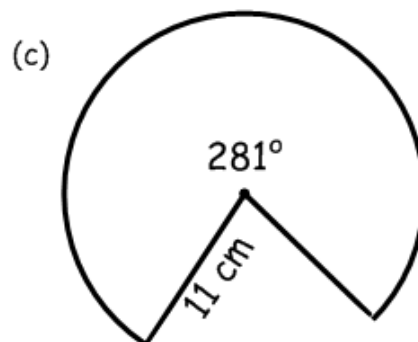
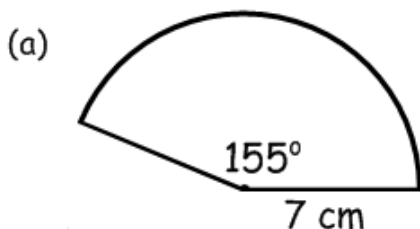
1. Calculate the **perimeter** of each shape:



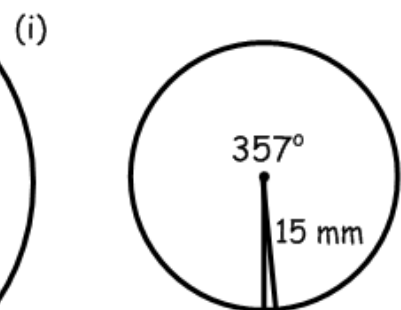
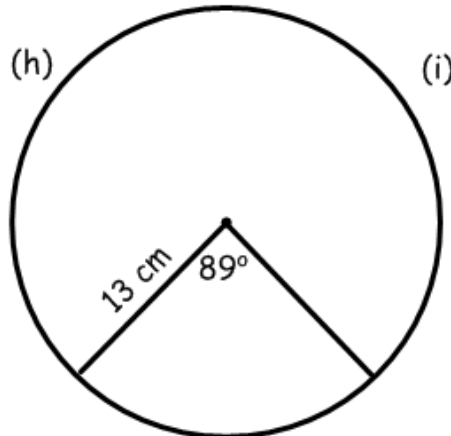
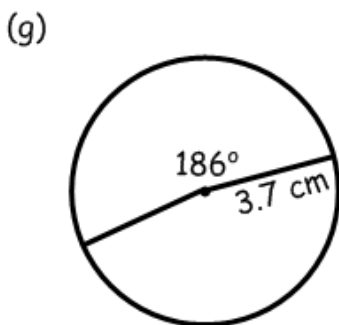
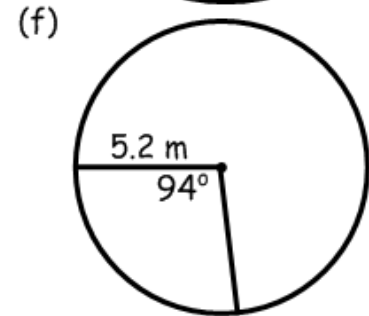
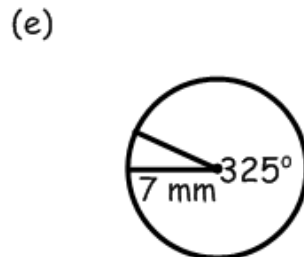
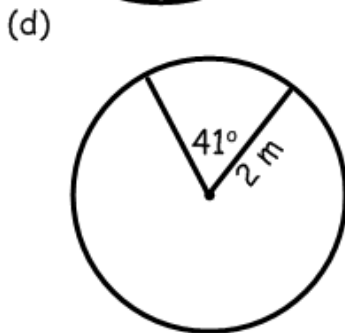
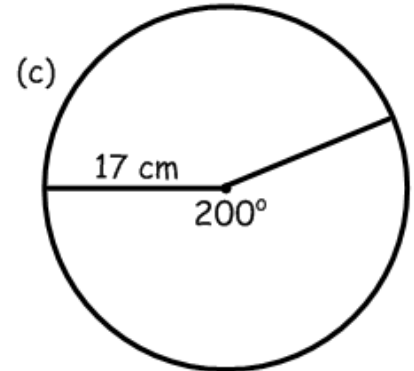
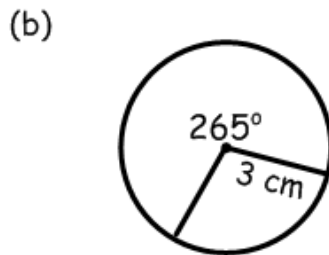
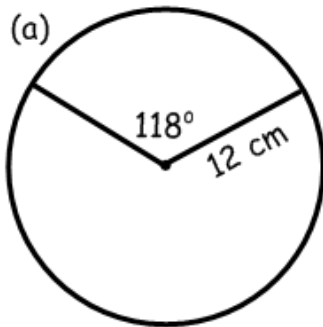
2. Now calculate the **area** of each of the above shapes.

3. For each sector, calculate:

- (i) The length of the arc.
- (ii) The area of the sector.



4. In each circle calculate:
- The length of both the **minor** and **major** arc,
 - The area of both the **minor** and **major** sector.



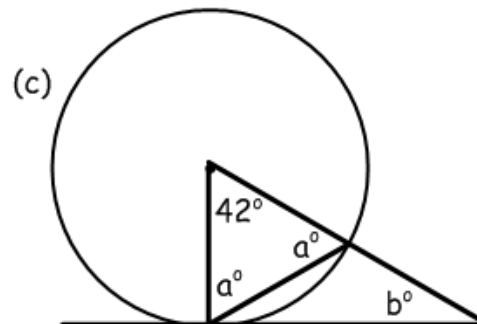
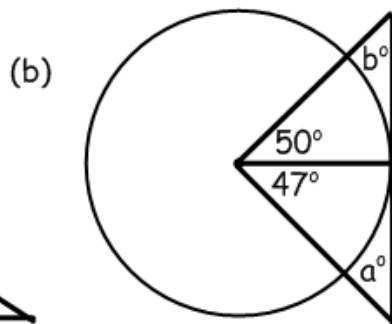
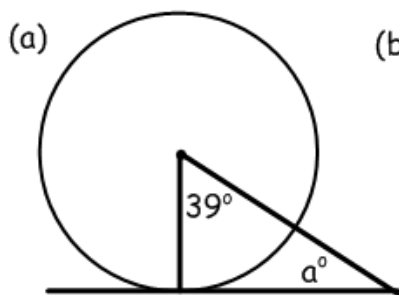
For revision of level 4 so far, now try...

007⁵
MATHTRACK

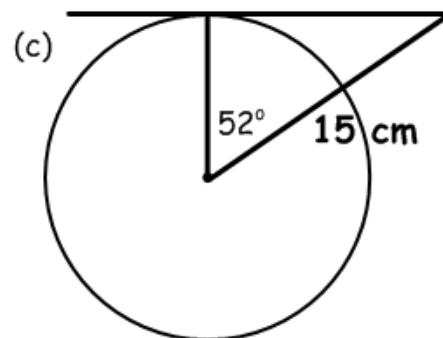
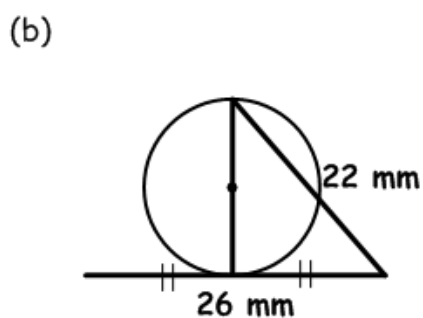
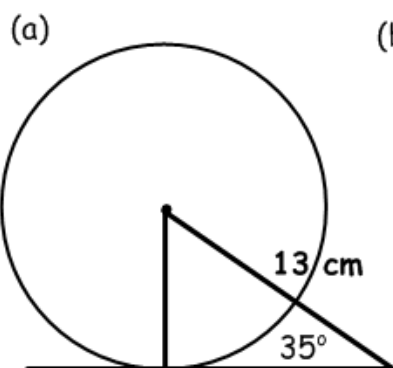


31. Tangent to a Circle (MTH 4-17a)

1. Use the relationship between a tangent and a circle to calculate the missing angles below:

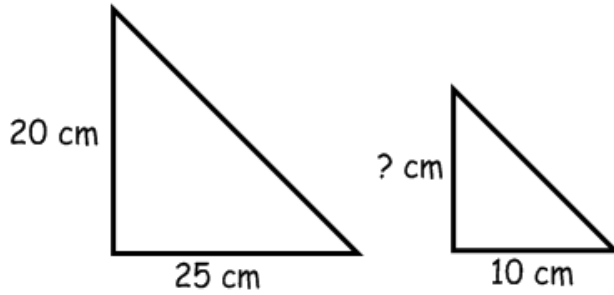


2. Calculate the size of the radius in each circle:



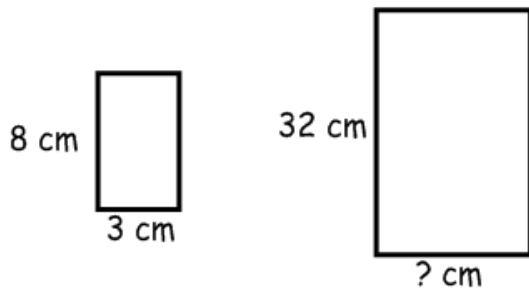
32. Similarity (MTH 4-17b)

1. The two triangles below are mathematically similar.



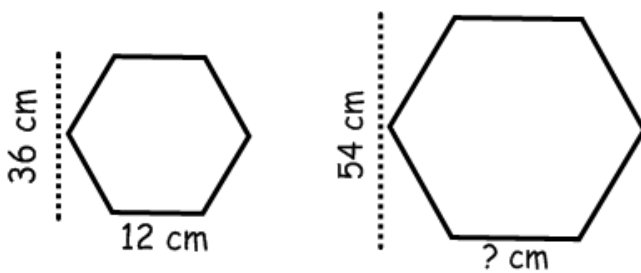
- (a) Find the scale factor.
 (b) Calculate the length of the missing side.

2. Both rectangles are mathematically similar.



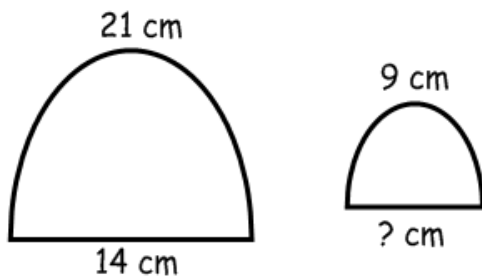
- (a) Find the scale factor.
 (b) Calculate the length of the missing side.

3. These shapes are mathematically similar.



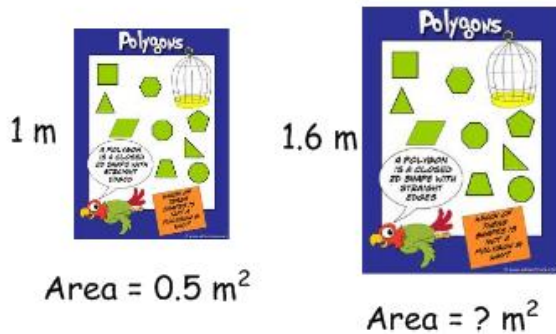
- (a) Find the scale factor.
 (b) Calculate the length of the missing side.

4. These shapes are mathematically similar.



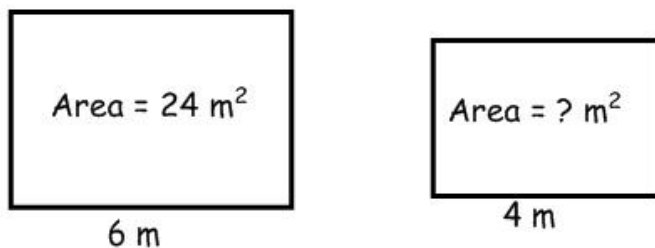
- (a) Find the scale factor.
 (b) Calculate the length of the missing side.

5. The two posters are mathematically similar.



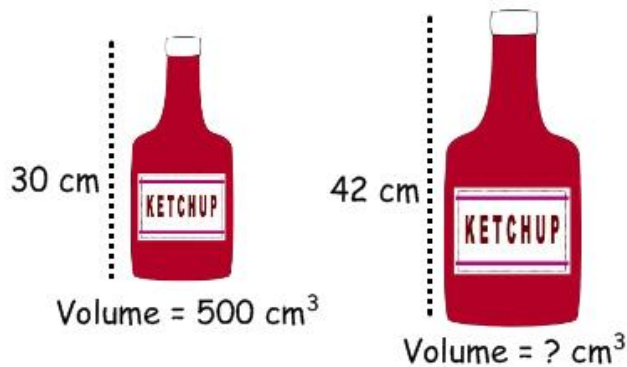
Calculate the area of the larger poster.

6. The carpets in two separate rooms of a house are mathematically similar.



Calculate the area of the smaller carpet.

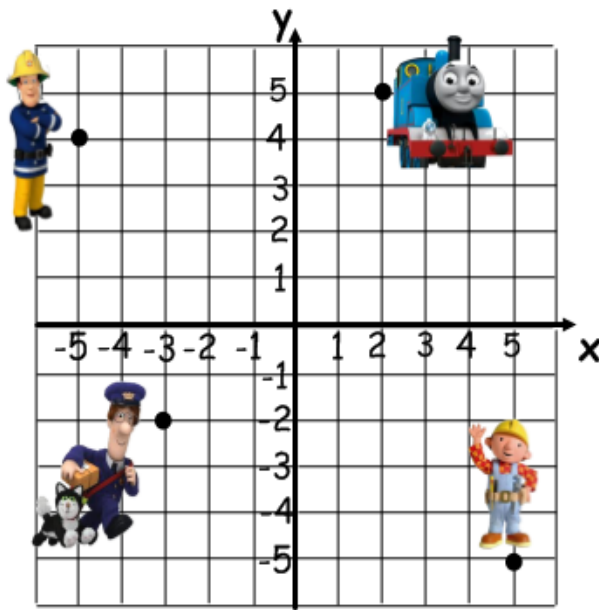
7. The two bottles of ketchup are mathematically similar.







Calculate the volume of the larger bottle.

33. 4 Quadrant Coordinates (MTH 4-18a)

1. Use the grid of this town to identify the coordinates of each place:



- (a) Fire Station 
- (b) Building Site 
- (c) Post Office 
- (d) Train Station 

2. Draw your own coordinate grid with values of x between -5 and 5 and values of y between -5 and 5 .

Now plot the following points on the grid:

$A(1, -5)$; $B(-5, 3)$; $C(-2, -2)$; $D(0, -3)$; $E(-3, 1)$; $F(2, 5)$; $G(-4, 0)$.

learningupgrade.com Math Demo Coordinate song



or try

Coordinates!



34. Shapes on a Coordinate Grid (MTH 4-18b)

1. Draw your own coordinate grid with values of x between -5 and 5 and values of y between -5 and 5 .
 - (a) Plot the following points on the grid:
 $A(3, 2)$; $B(-1, 2)$; $C(-1, -2)$.
 - (b) Plot point D to make a square.
 - (c) What are the coordinates of point D ?

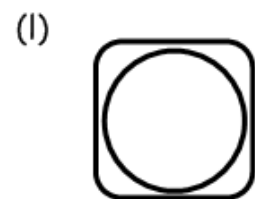
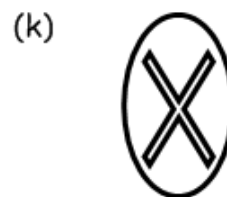
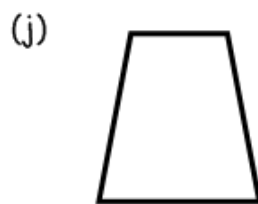
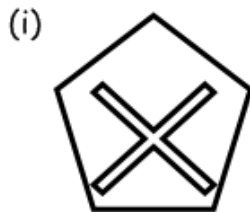
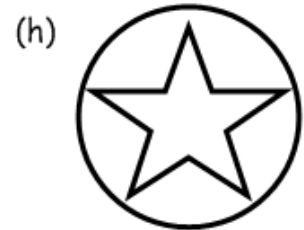
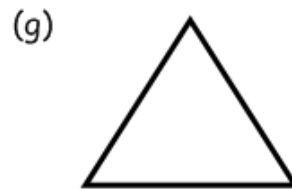
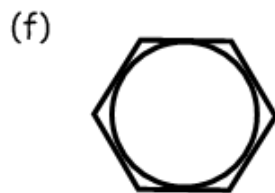
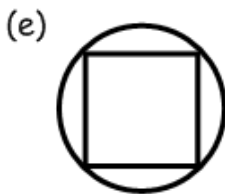
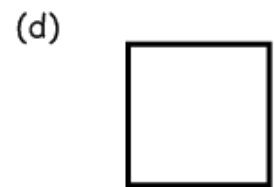
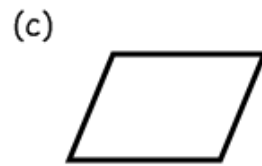
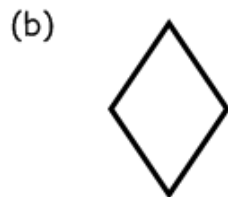
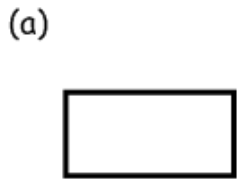
2. Draw your own coordinate grid with values of x between -5 and 5 and values of y between -5 and 5 .
 - (a) Plot the following points on the grid:
 $P(4, 4)$; $Q(-5, 4)$; $R(4, -1)$.
 - (b) Plot point S to make a rectangle.
 - (c) What are the coordinates of point S ?

3. Draw your own coordinate grid with values of x between -5 and 5 and values of y between -5 and 5 .
 - (a) Plot the following points on the grid:
 $W(3, 3)$; $X(-2, 3)$; $Y(-3, -3)$.
 - (b) Plot point Z to make a parallelogram.
 - (c) What are the coordinates of point Z ?

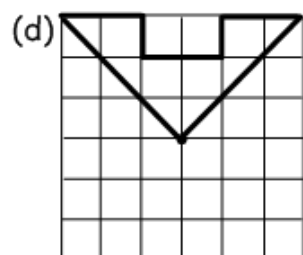
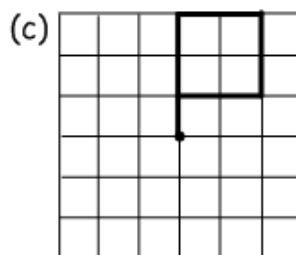
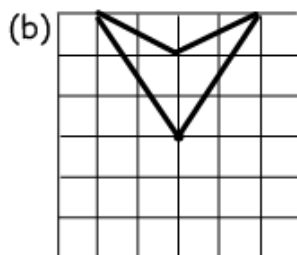
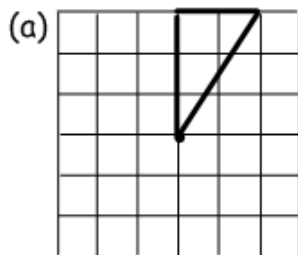
4. Draw your own coordinate grid with values of x between -5 and 5 and values of y between -5 and 5 .
 - (a) Plot the following points on the grid:
 $H(0, 5)$; $I(0, -3)$; $J(-2, 1)$.
 - (b) Plot point K to make a rhombus
 - (c) What are the coordinates of point K ?

35. Rotational Symmetry (MTH 4-19a)

1. For the following shapes state:
 (i) The turn symmetry,
 (ii) The order of rotational symmetry.



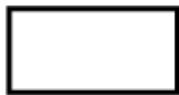
2. Complete the following shapes so they have:
 (i) Half turn symmetry,
 (ii) Quarter turn symmetry.



36. Translation Symmetry (MTH 4-19a)

1. Which of the following shapes tile?

(a)



(b)



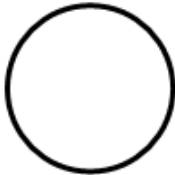
(c)



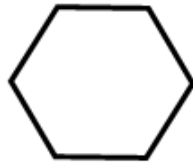
(d)



(e)



(f)



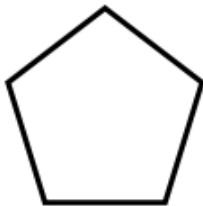
(g)



(h)



(i)



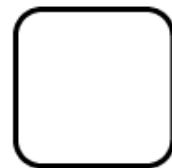
(j)



(k)



(l)



2. Of the above shapes which do have translation symmetry, tile them at least 10 times.

Level 4: Information Handling



Level 4: Information Handling

Contents

- 37. Mean, Median, Mode and Range (MNU 4-20b)
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37. Mean, Median, Mode and Range (MNU 4-20b)

learningupgrade.com: Mean, Median, Mode Song

1. Calculate the **mean** from the following data sets:

(a) 3, 3, 5, 6, 6, 6, 7, 8, 9

(b) 19, 20, 22, 22, 25, 28

(c) 3.1, 4.2, 4.7, 4.9, 5.0, 5.1, 5.3, 5.6

(d) 11, 5, 9, 3, 13, 2, 3, 10, 3, 6

(e) 0.8, 0.4, 0.4, 0.7, 0.2, 0.9

(f) 29, 31, 23, 32, 40, 41, 30

2. Calculate the **median** from the following data sets:

(a) 3, 3, 5, 6, 6, 6, 7, 8, 9

(b) 19, 20, 22, 22, 25, 28

(c) 3.1, 4.2, 4.7, 4.9, 5.0, 5.1, 5.3, 5.6

(d) 11, 5, 9, 3, 13, 2, 3, 10, 3, 6

(e) 0.8, 0.4, 0.4, 0.7, 0.2, 0.9

(f) 29, 31, 23, 32, 40, 41, 30

3. Calculate the **mode** from the following data sets:

(a) 3, 3, 5, 6, 6, 6, 7, 8, 9

(b) 19, 20, 22, 22, 25, 28

(c) 3.1, 4.2, 4.7, 4.9, 5.0, 5.1, 5.3, 5.6

(d) 11, 5, 9, 3, 13, 2, 3, 10, 3, 6

(e) 0.8, 0.4, 0.4, 0.7, 0.2, 0.9

(f) 29, 31, 23, 32, 40, 41, 30

4. Calculate the **range** from the following data sets:

(a) 3, 3, 5, 6, 6, 6, 7, 8, 9

(b) 19, 20, 22, 22, 25, 28

(c) 3.1, 4.2, 4.7, 4.9, 5.0, 5.1, 5.3, 5.6

(d) 11, 5, 9, 3, 13, 2, 3, 10, 3, 6

(e) 0.8, 0.4, 0.4, 0.7, 0.2, 0.9

(f) 29, 31, 23, 32, 40, 41, 30

5. The data set below shows the number of pupils per first year class who regularly read books:

13, 15, 10, 22, 11, 7, 24, 15

- (a) What is the mean number of pupils per class who regularly read books?
- (b) What is the median number of pupils per class who regularly read books?
- (c) What is the modal number of pupils per class who regularly read books?
- (d) What is the range of pupils per class who regularly read books?
- (e) Given that there are thirty pupils in each class, use the statistics you have obtained to write a summary of the data.

6. The data shown below is the number of people who attended each showing of a new film in the local cinema:

48, 51, 66, 72, 65, 71, 90, 85, 73, 67, 95

- (a) What is the mean number of attendees?
- (b) What is the median number of attendees?
- (c) What is the modal number of attendees?
- (d) What is the range of attendees?
- (e) Given this particular cinema seats 100 people, use the statistics you have obtained to write a summary of the data.

7. The data set displayed is the heights in metres of a group of friends attending a theme park:

1.35, 1.28, 1.45, 1.49, 1.22, 1.36, 1.19, 1.51

- (a) What is the mean height of the group?
- (b) What is the median height of the group?
- (c) What is the modal height of the group?
- (d) What is the range of heights?
- (e) Given the average height requirement for a roller coaster is 1.25 metres, will the group be able to ride most of the roller coaster?
Explain your answer.



Now try



Mean, Median, Mode & Range!



38. Misleading Averages (MNU 4-20b)

1. The data set below shows the number of games consoles sold by a retailer over the past week:

3, 0, 1, 2, 35, 38, 32

- (a) What was the mean number of consoles sold?
- (b) What was the median number of consoles sold?
- (c) What was the modal number of consoles sold?
- (d) What was the range of consoles sold?
- (e) What makes the averages misleading?
- (f) What do you think the possible reasons could have been for such misleading averages?



2. The data set shows average speed, in metres per second, of an Olympic swimmer over the past 12 months:

1.6, 1.5, 1.4, 1.4, 1.6, 1.4, 0.4, 0.5, 0.4, 0.6, 0.5, 0.7

- (a) What was their mean average speed?
- (b) What was their median average speed?
- (c) What was their modal average speed?
- (d) What was their range of average speeds?
- (e) What makes the averages misleading?
- (f) What do you think the possible reasons could have been for such misleading averages?



3. The data set below display cost of 1 litre petrol, in pence, at a particular garage over the past 8 years:

103, 99, 102, 100, 98, 165, 172

- (a) What is the mean cost of petrol per litre from the last 8 years?
- (b) What is the median cost of petrol per litre from the last 8 years?
- (c) What is the modal cost of petrol per litre from the last 8 years?
- (d) What is their range of petrol price from the past 8 years?
- (e) What makes the averages misleading?
- (f) What do you think the possible reasons could have been for such misleading averages?

39. Reading Graphs (MNU 4-20a)

1. The stem-and-leaf graph shows the number of points a basketball team scored in their last 20 matches.

7	8 9	$n = 20$
8	0 4 6 9 9	
9	1 2 2 3 4 6 8 8 8	$9 \mid 5$ represents 95 points
10	2 5 6 6	



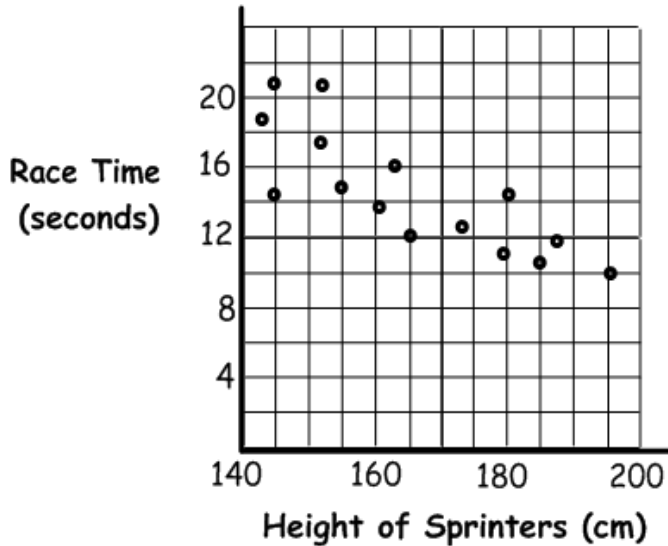
- (a) What was the most number of points this team scored in the last 20 matches?
 (b) What was the least number of points this team scored in the last 20 matches?
 (c) What was the modal number of points this team scored in the last 20 matches?
 (d) What was the median number of points this team scored in the last 20 matches?
 (e) Based on the graph and the statistics you have obtained, would you say this was a good basketball team?
2. The stem-and-leaf graph shows the average number of goals per game a veteran striker has kept over the past 15 seasons.

0	1 4 9 9	$n = 15$
1	0 0 0 1 2 7 7 9	
2	0 1 1	$0 \mid 8$ represents 0.8 goals per game



- (a) What was the best average of goals per game in the last 15 seasons?
 (b) What was the worst average of goals per game in the last 15 seasons?
 (c) What was the modal average of goals per game in the last 15 seasons?
 (d) What was the median average of goals per game in the last 15 seasons?
 (e) Based on the graph and the statistics you have obtained, would you say the striker had a good record for goals per game?

3. The scatter graph shows the relationship between the height of sprinters in centimetres and their race time in seconds for the 100 metres race:



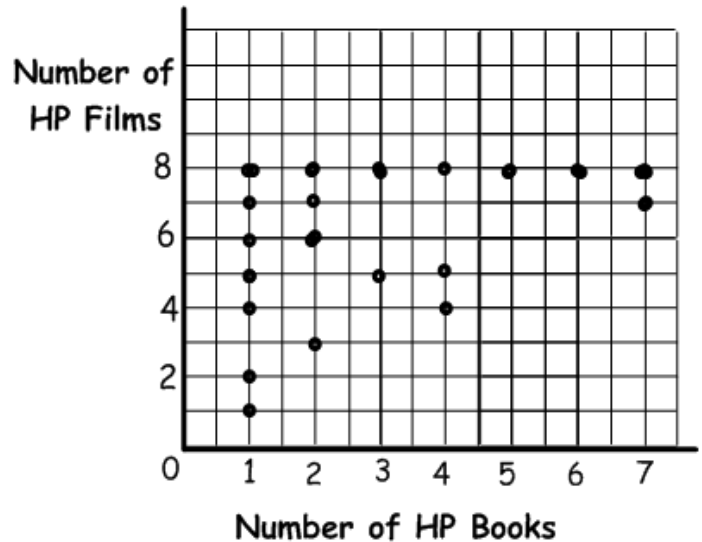
(a) From the graph is there a strong correlation between height and race time?

(b) If so write a statement about the correlation between the height of sprinters and their race time.

4. The scatter graph shows the relationship between the number of Harry Potter books people have read and the number of the Harry Potter films they have went to see.

(a) From the graph, is there a strong correlation between people who have read the books and also seen the films?

(b) Which do you think are more popular: the books or the films? Explain why.



40. Interpreting Raw Data (MNU 4-20a)

1. The table shows the information obtained from measuring the fitness of nine 25 to 35 year old males. Their weight in kilograms has been measured against their result in a bleep test:

Adult	1	2	3	4	5	6	7	8	9
Weight (kg)	75	92	99	81	105	87	77	115	94
Bleep Test	41	22	18	38	10	29	36	6	18

- (a) Interpret this information in a scatter graph.
(b) Is there a correlation between a mans weight and his fitness? Explain.
2. 15 years ago, 10 school pupils were given an intelligence test. In a follow up to this test, these pupils who are now adults have given their annual salary to the nearest £1000. The information is shown in the table below:

Pupil	A	B	C	D	E	F	G	H	I	J
Score (%)	85	72	90	52	40	70	22	81	15	60
Salary (£1000)	42	30	35	24	25	21	16	38	14	31

- (a) Interpret this information in a scatter graph.
(b) Is there a correlation between the results of the intelligence test and their current annual salary? Give possible reasons for any **outliers**.
3. The amount spent on 10 brand new cars at a local car dealership, is shown below:
£12 300, £11 800, £12 500, £10 200, £11 500,
£12 700, £13 000, £12 300, £10 900, £12 100
- (a) Interpret this information in a stem-and-leaf graph.
(b) From the graph find the median cost of a brand new car.
(c) From the graph find the modal cost of a brand new car.

4. The cost of 9 different televisions in an electronics shop are shown below:

**£760, £140, £350, £720, £400,
£560, £540, £180, £280**

- (a) Interpret this information in a stem-and-leaf graph.
- (b) From the graph find the median cost of a television.
- (c) From the graph find the modal cost of a television.

5. The number of games lost by a rugby team in each of the past fifteen seasons are displayed below:

**12, 20, 17, 23, 15,
12, 21, 10, 30, 29,
21, 18, 12, 9, 12**

- (a) Interpret this information in a stem-and-leaf graph.
- (b) From the graph find the median number of games lost in a season.
- (c) From the graph find the modal number of games lost in a season.

6. The results (%) of a maths test for second year pupils are shown below:

75, 81, 62, 66, 67, 81, 83, 89, 50, 71, 55, 91, 86, 75, 59, 77, 78

- (a) Display this information in a stem-and-leaf graph.
- (b) From the graph find the median test score.
- (c) From the graph find the modal test score.

41. Comparative Graphs (MTH 4-21a)

- Below are the scores from contestants competing in a game show over two weeks. The aim of the game show is to get the lowest possible score:
Week 1: 20, 32, 45, 33, 31, 37, 40, 19, 28, 41, 15, 7, 39, 23
Week 2: 7, 15, 38, 22, 24, 22, 28, 37, 39, 18, 10, 28, 15, 11
 - Display this information in a back-to-back stem-and-leaf graph.
 - From each graph find the median score.
 - Comment on which week you think the contestants performed better.
- A sprinter is training for the Olympics. He records data on his performances in training to assist his preparation for the games. Below are the times (in seconds) for his 100 metre training from the two months leading up to the games:
May: 10.7, 11.3, 10.3, 11.5, 12.1, 11.7, 10.9, 10.8, 10.3, 12.2, 10.0
June: 12.0, 11.3, 11.0, 10.0, 10.1, 9.9, 10.5, 10.1, 10.6, 9.9, 10.0
 - Display this information in a back-to-back stem-and-leaf graph.
 - From each graph find the median and modal time.
 - From the graphs and averages, do you think the sprinter is improving as he gets closer to the games?
- In January of this year, Fiona decided to start budgeting her wages more effectively and save as much money as she could. Shown below is the amount she saved each month (rounded to the nearest £10) over the past two years:
Last Year: £110, £120, £240, £300, £90, £140, £100, £170, £200, £160, £110, £80
This Year: £100, £100, £250, £250, £310, £350, £420, £290, £320, £400, £150, £110
 - Display this information in a back-to-back stem-and-leaf graph.
 - From each graph find the median and modal amount saved.
 - From the graphs and averages, do you think Fiona's financial plan worked?

42. Risk Assessment (MNU 4-22a)

<p>Name: Tom Cruise Age: 49 Occupation: Movie Actor Hazards: Stunt work</p>  <p>Accident Probability: 0.45</p>	<p>Name: Lady Gaga Age: 26 Occupation: Singer/Performer Hazards: Dancing/Acrobatics</p>  <p>Accident Probability: 0.34</p>
<p>Name: Lewis Hamilton Age: 27 Occupation: Formula 1 Driver Hazards: Crashes/Explosions</p>  <p>Accident Probability: 0.8</p>	<p>Name: John Cena Age: 35 Occupation: Wrestler Hazards: Injury</p>  <p>Accident Probability: 0.93</p>
<p>Name: Bear Grylls Age: 37 Occupation: TV Presenter Hazards: Poisoning/Dehydration</p>  <p>Accident Probability: 0.23</p>	<p>Name: Homer Simpson Age: 36 Occupation: Nuclear Safety Hazards: Nuclear Meltdown</p>  <p>Accident Probability: 0.99</p>

Age \ Accident Probability	0-15	16-30	31-50	51-65	75+
0.01-0.25	1.25	1.75	2.0	2.5	2.75
0.26-0.5	2.35	2.8	3.5	4.75	5
0.51-0.75	4.15	7.25	10.5	12	12
0.75-0.99	7.75	12.1	15.25	20.0	30.0

The above table shows the amount it costs (in £1000) to insure an individual based on their risk assessment. It is dependent on the individuals age and their accident probability, based on their occupation.

State the amount in insurance each individual must pay.

Risk Assessment Task

Choose a famous person who you like. You must conduct a risk assessment on them. To conduct a successful risk assessment, follow these instructions:

Step 1: Identify the hazards of their occupation.

Step 2: Decide how they or others might be harmed.

Step 3: Evaluate the risks and decide on precautions.

Step 4: Record your findings in a report.

Step 5: Report your risk assessment to the rest of your class.