Exceeding ANSWERS

N28a

Long Multiplication
Integers
Answers

1) $17 \times 32 = 544$

2) $24 \times 62 = 1488$

3) $13 \times 156 = 2028$

4) $528 \times 16 = 8448$

5) $34 \times 466 = 15844$

N28b Long Multiplication Decimals *Answers*

1) $1.5 \times 22 = 33$

2) $7.6 \times 2.1 = 15.96$

3) $4.5 \times 9.99 = 44.955$

4) $19.7 \times 6.3 = 124.11$

5) $0.35 \times 0.12 = 0.042$

N28b Long Multiplication Decimals *Answers*

1) Work out what the * must be.

a)

$$\begin{array}{r} 1\ 3\ 5 \\ \times\ \ 1\ 2 \\ \hline 2\ 7\ 0 \\ 1\ 3\ 5\ 0 \\ \hline 1\ 6\ 2\ 0 \end{array}$$

b)

×	60	3
80	4800	240
2	120	6

answer: 5166

c)

$$\begin{array}{r} 4\ 9 \\ \times\ \ 1\ 7 \\ \hline 3\ 4\ 3 \\ 4\ 9\ 0 \\ \hline 8\ 3\ 3 \end{array}$$

d)

×	90	5
100	9000	500
40	3600	200
5	450	25

answer: 13775

2) A school organises a trip to a museum.

They set off in 13 minibuses, each minibus containing 24 pupils who will each pay to go into the museum.

Entrance to the museum costs £1.20 per person.

a) How many people made the trip? 312

b) What was the total cost? £374.40

N29a

Long Division
Integers
Answers

1) 288 ÷ 12 = 24

2) 285 ÷ 15 = 19

3) 425 ÷ 25 = 17

4) 784 ÷ 56 = 14

5) 874 ÷ 38 = 23

N29b

Long Division
Decimals
Answers

1) $79.2 \div 22 = 3.6$

2) $5.89 \div 19 = 0.31$

3) $9.87 \div 47 = 0.21$

4) $330.2 \div 13 = 25.4$

5) $42.624 \div 16 = 2.664$

N29b Long Division Decimals *Answers*

1) a) If 48 luxurious pens cost £768,
how much would one of them cost? £16

b) If 25 tee shirts cost £77.50,
how much would one of them cost? £3.10

c) If 53 mobile phones cost £2119.47,
how much would one of them cost? £39.99

2) Cans of juice cost 24p each.

Wendy has £8.65 to spend.

a) What is the maximum number of cans Wendy can buy? 36

b) How much change does she get? £0.01 or 1p

3) Find the missing digits.

a)
$$\begin{array}{r} 3\boxed{6} \\ 14\overline{)\boxed{5}04} \end{array}$$

b)
$$\begin{array}{r} 2\boxed{1} \\ \boxed{1}2\overline{)2\boxed{5}2} \end{array}$$

N30a/b Prime Numbers Introduction and Factorisation

Answers

1) Write down the first 9 prime numbers.

2, 3, 5, 7, 11, 13, 17, 19, 23

2) Write down the first prime number that comes after 62. **67**

3) Split up the following numbers into the product of their prime factors.

a) 12 **2 × 2 × 3**

b) 45 **3 × 3 × 5**

c) 72 **2 × 2 × 2 × 3 × 3**

d) 120 **2 × 2 × 2 × 3 × 5**

e) 550 **2 × 5 × 5 × 11**

f) 1296 **2 × 2 × 2 × 2 × 3 × 3 × 3 × 3**

4) Find the Highest Common Factor (HCF) of the following numbers.

a) 4 and 6 **2**

b) 8 and 16 **8**

c) 36 and 48 **12**

d) 300 and 525 **75**

e) 374 and 918 **34**

f) 45, 90 and 105 **15**

N31a/b

Highest Common Factor
Lowest Common Multiple

Answers

1) Find the Highest Common Factor (HCF) of the following numbers.

a) 4 and 6 **2**

b) 8 and 16 **8**

c) 36 and 48 **12**

d) 300 and 525 **75**

e) 374 and 918 **34**

f) 45, 90 and 105 **15**

2) Find the Lowest Common Multiple (LCM) of the following numbers.

a) 8 and 12 **24**

b) 30 and 45 **90**

c) 15 and 18 **90**

d) 4, 6 and 8 **24**

e) 24 and 84 **168**

f) 72 and 96 **288**

3) The bells at Kings School ring every 6 minutes.

At Queens School the bells ring every 5 minutes.

At Princess School the bells ring every 9 minutes.

All three bells ring together at 8.30 am.

When is the next time the bells of the three schools will ring together? **10 am**

N32 Decimals, Fractions and Percentages *Answers*

1) Complete the tables.

a)

Fraction	Decimal	Percentage
$\frac{1}{2}$	**0.5**	50%
$\frac{1}{4}$	0.25	**25%**
$\frac{1}{10}$	**0.1**	**10%**
$\frac{1}{3}$	**$0.\dot{3}$**	**$33.\dot{3}\%$**
$\frac{7}{10}$	0.7	**70%**
$\frac{2}{5}$	**0.4**	40%

b)

Fraction	Decimal	Percentage
$\frac{68}{100}$	**0.68**	**68%**
$\frac{7}{20}$	**0.35**	35%
$\frac{3}{5}$	0.6	**60%**
$\frac{2}{3}$	$0.\dot{6}$	**$66.\dot{6}\%$**
$\frac{1}{20}$	**0.05**	5%
$\frac{13}{50}$	**0.26**	**26%**

2) Put these fractions, decimals and percentages in order, smallest to largest.

a) $\frac{1}{2}$, 49%, $\frac{3}{5}$, 0.55 **49%, $\frac{1}{2}$, 0.55, $\frac{3}{5}$**

b) 27%, 0.2, $\frac{1}{4}$, $\frac{3}{10}$ **0.2, $\frac{1}{4}$, 27%, $\frac{3}{10}$**

c) $\frac{9}{10}$, 95%, 0.99, $\frac{97}{100}$ **$\frac{9}{10}$, 95%, $\frac{97}{100}$, 0.99**

d) $\frac{1}{3}$, 0.6, $\frac{2}{3}$, 30% **30%, $\frac{1}{3}$, 0.6, $\frac{2}{3}$**

e) 0.125, 10%, $\frac{11}{100}$, 0.09 **0.09, 10%, $\frac{11}{100}$, 0.125**

3) Chris says that $\frac{3}{4}$ is halfway between 0.5 and 100%.

Is Chris correct? You must explain your answer.

Yes. 0.5 is $\frac{2}{4}$ and 100% is $\frac{4}{4}$ and $\frac{3}{4}$ is halfway between them.

4) Emily says that 0.2 is halfway between 10% and $\frac{3}{5}$.

Is Emily correct? You must explain your answer.

No. 10% is 0.1 and $\frac{3}{5}$ is 0.6 and 0.2 is not halfway between them.

N33 Fraction of an Amount

Answers

1) Find the following:

a) $\frac{1}{3}$ of 24 = 8

b) $\frac{2}{3}$ of 24 = 16

c) $\frac{1}{5}$ of 30 = 6

d) $\frac{3}{5}$ of 30 = 18

e) $\frac{1}{8}$ of 40 = 5

f) $\frac{5}{8}$ of 40 = 25

2) Work out:

a) $\frac{7}{10}$ of £30 = £21

b) $\frac{3}{7}$ of £84 = £36

c) $\frac{4}{5}$ of £1.50 = £1.20

d) $\frac{11}{20}$ of £19 = £10.45

e) $\frac{2}{9}$ of £10.98 = £2.44

f) $\frac{8}{13}$ of £31.85 = £19.60

3) Julie has £4.50 pocket money every week.
If she spends $\frac{2}{5}$ of it on a magazine and $\frac{1}{3}$ of it on a dance lesson, how much of the pocket money does she have left? £1.20

4) Paul has £7.80 pocket money each week.
He always saves $\frac{1}{3}$ of it.
With the remaining money he spends $\frac{5}{8}$ on comics and the rest on sweets.

(i) How much does he save? £2.60

(ii) How much is spent on comics? £3.25

(iii) How much does he spend on sweets? £1.95

N33 Fraction of an Amount

Answers

1) a) Find $\frac{1}{2}$ of $\left(\frac{2}{3} \text{ of } 60\right)$ = 20

b) Find $\frac{3}{4}$ of $\left(\frac{1}{2} \text{ of } 80\right)$ = 30

c) Find $\frac{1}{2}$ of $\frac{4}{9}$ of $\frac{3}{4}$ of 42 = 7

2) a) If $\frac{3}{4}$ of a number is 60, what is the number? 80

b) If $\frac{3}{7}$ of a number is 21, what is the number? 49

c) If $\frac{4}{9}$ of a number is 12.3, what is the number? 27.675

3) If $\frac{1}{2}$ of $\frac{1}{5}$ of a number is 6, what is the number? 60

4) If $\frac{1}{2}$ of $\frac{1}{3}$ of $\frac{1}{4}$ of $\frac{1}{5}$ of a number is 2.5, what is the number? 300

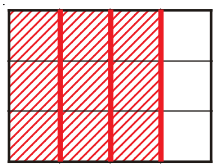
5) If $\frac{3}{5}$ of $\frac{1}{2}$ of $\frac{2}{3}$ of a number is 3.8, what is the number? 19

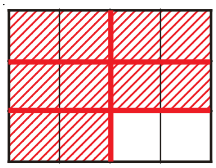
N34 Ordering Fractions

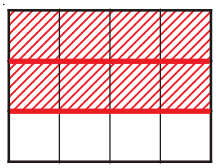
Answers

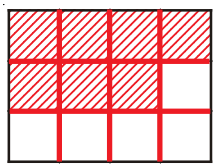
1) $\frac{7}{12}$ $\frac{2}{3}$ $\frac{3}{4}$ $\frac{5}{6}$ The correct answer

The working

$\frac{3}{4}$  9 squares

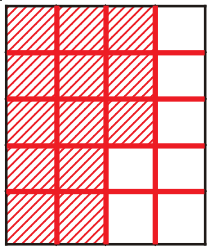
$\frac{5}{6}$  10 squares

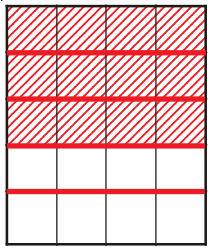
$\frac{2}{3}$  8 squares

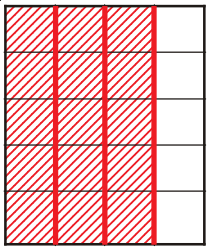
$\frac{7}{12}$  7 squares

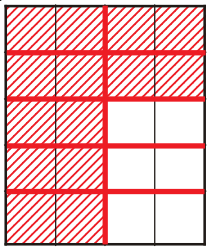
2) $\frac{3}{5}$ $\frac{13}{20}$ $\frac{7}{10}$ $\frac{3}{4}$ The correct answer

The working

$\frac{13}{20}$  13 squares

$\frac{3}{5}$  12 squares

$\frac{3}{4}$  15 squares

$\frac{7}{10}$  14 squares

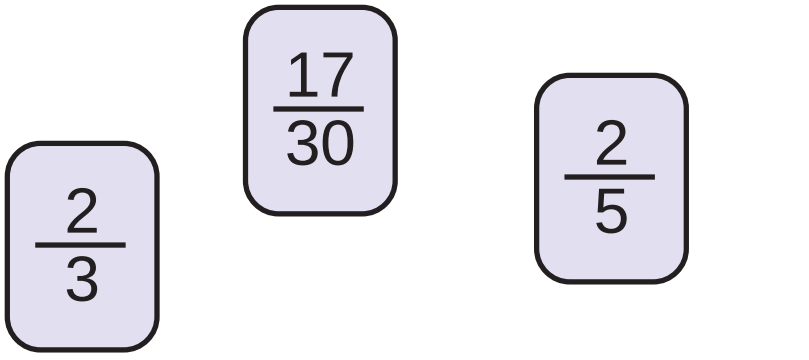
3) $\frac{1}{2}$ $\frac{13}{24}$ $\frac{7}{12}$ $\frac{5}{8}$ The correct answer

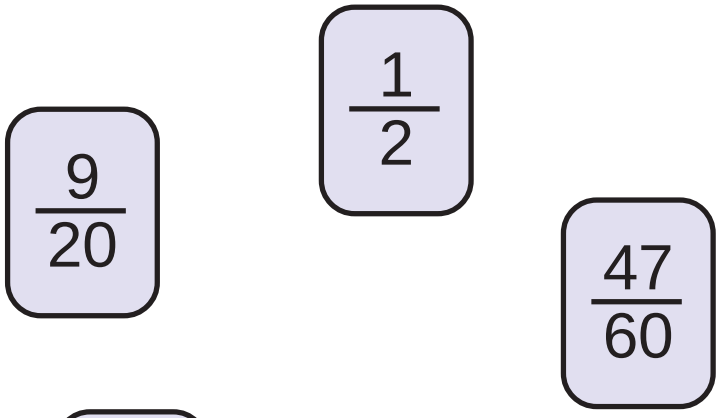
4) $\frac{1}{6}$ $\frac{3}{10}$ $\frac{1}{3}$ $\frac{2}{5}$ The correct answer

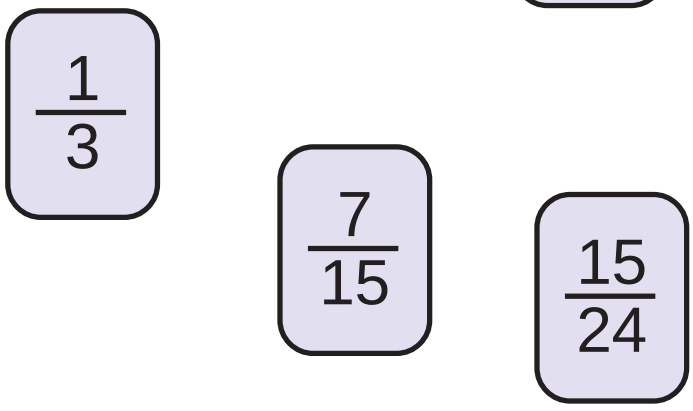
N34 Ordering Fractions

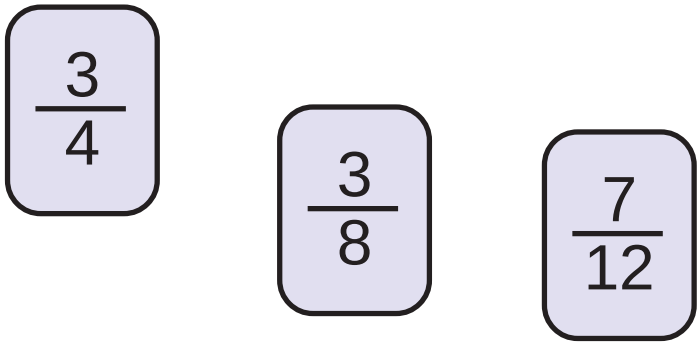
Answers

Place the fractions on the cards in order of size from smallest to largest.









Smallest

$\frac{1}{3}$ $\frac{40}{120}$

$\frac{3}{8}$ $\frac{45}{120}$

$\frac{2}{5}$ $\frac{48}{120}$

$\frac{9}{20}$ $\frac{54}{120}$

$\frac{7}{15}$ $\frac{56}{120}$

$\frac{1}{2}$ $\frac{60}{120}$

$\frac{17}{30}$ $\frac{68}{120}$

$\frac{7}{12}$ $\frac{70}{120}$

$\frac{15}{24}$ $\frac{75}{120}$

$\frac{2}{3}$ $\frac{80}{120}$

$\frac{3}{4}$ $\frac{90}{120}$

$\frac{47}{60}$ $\frac{94}{120}$

Largest

N35 Improper Fractions Mixed Numbers *Answers*

1) Convert the following improper fractions to mixed numbers.

a) $\frac{5}{4}$ **$1\frac{1}{4}$**

b) $\frac{8}{3}$ **$2\frac{2}{3}$**

c) $\frac{12}{7}$ **$1\frac{5}{7}$**

d) $\frac{20}{9}$ **$2\frac{2}{9}$**

e) $\frac{16}{5}$ **$3\frac{1}{5}$**

f) $\frac{25}{3}$ **$8\frac{1}{3}$**

g) $\frac{30}{7}$ **$4\frac{2}{7}$**

h) $\frac{75}{8}$ **$9\frac{3}{8}$**

i) $\frac{47}{12}$ **$3\frac{11}{12}$**

j) $\frac{100}{9}$ **$11\frac{1}{9}$**

2) Convert the following mixed numbers to improper fractions.

a) $1\frac{3}{5}$ **$\frac{8}{5}$**

b) $2\frac{1}{4}$ **$\frac{9}{4}$**

c) $5\frac{2}{3}$ **$\frac{17}{3}$**

d) $3\frac{3}{5}$ **$\frac{18}{5}$**

e) $11\frac{2}{7}$ **$\frac{79}{7}$**

f) $10\frac{1}{9}$ **$\frac{91}{9}$**

g) $7\frac{5}{8}$ **$\frac{61}{8}$**

h) $9\frac{4}{5}$ **$\frac{49}{5}$**

i) $6\frac{3}{11}$ **$\frac{69}{11}$**

j) $12\frac{3}{4}$ **$\frac{51}{4}$**

3) Put these numbers in order, lowest to highest.

a) 3.5, $3\frac{1}{5}$, $\frac{11}{3}$ **$3\frac{1}{5}$ 3.5 $\frac{11}{3}$**

b) $7\frac{1}{4}$, 7.14, $\frac{34}{5}$ **$\frac{34}{5}$ 7.14 $7\frac{1}{4}$**

c) $1\frac{1}{10}$, 98%, $\frac{5}{4}$, 1 **98% 1 $1\frac{1}{10}$ $\frac{5}{4}$**

N36 Fractions Adding and Subtracting *Answers*

1) Work out the following, simplifying your answers where possible.

a) $\frac{2}{7} + \frac{3}{7} = \mathbf{\frac{5}{7}}$

b) $\frac{3}{8} + \frac{1}{8} = \mathbf{\frac{1}{2}}$

c) $\frac{7}{9} - \frac{2}{9} = \mathbf{\frac{5}{9}}$

d) $\frac{5}{10} - \frac{1}{10} = \mathbf{\frac{2}{5}}$

e) $\frac{1}{6} + \frac{2}{3} = \mathbf{\frac{3}{18}} + \mathbf{\frac{12}{18}} = \mathbf{\frac{5}{6}}$

f) $\frac{1}{6} + \frac{2}{3} = \mathbf{\frac{1}{6}} + \mathbf{\frac{4}{6}} = \mathbf{\frac{5}{6}}$

g) $\frac{4}{5} - \frac{1}{2} = \mathbf{\frac{3}{10}}$

h) $\frac{14}{15} - \frac{3}{5} = \mathbf{\frac{14}{15}} - \mathbf{\frac{9}{15}} = \mathbf{\frac{1}{3}}$

2) Work out the following, simplifying your answers where possible.

a) $\frac{3}{8} + \frac{4}{8} = \mathbf{\frac{7}{8}}$

b) $\frac{9}{11} - \frac{5}{11} = \mathbf{\frac{4}{11}}$

c) $\frac{1}{2} + \frac{1}{3} = \mathbf{\frac{5}{6}}$

d) $\frac{5}{7} - \frac{3}{5} = \mathbf{\frac{4}{35}}$

e) $\frac{1}{2} + \frac{2}{5} = \mathbf{\frac{9}{10}}$

f) $\frac{5}{6} - \frac{1}{4} = \mathbf{\frac{7}{12}}$

g) $\frac{5}{12} + \frac{1}{6} = \mathbf{\frac{7}{12}}$

h) $\frac{4}{5} - \frac{1}{10} = \mathbf{\frac{7}{10}}$

i) $\frac{3}{8} + \frac{1}{2} = \mathbf{\frac{7}{8}}$

j) $\frac{8}{9} - \frac{5}{6} = \mathbf{\frac{1}{18}}$

3) Write the missing numbers in each of these fraction sums.

a) $\frac{1}{3} + \mathbf{\frac{4}{6}} = 1$

b) $\frac{3}{7} + \mathbf{\frac{12}{21}} = 1$

c) $\frac{8}{5} - \mathbf{\frac{9}{15}} = 1$

d) $\mathbf{\frac{15}{12}} - \frac{1}{4} = 1$

N37 a/b

Fractions - Multiplying and Dividing an Integer

Answers

1) Work out the following, giving your answers in their simplest forms

a) $3 \times \frac{1}{4}$ **$\frac{3}{4}$**

b) $7 \times \frac{1}{7}$ **1**

c) $2 \times \frac{4}{5}$ **$\frac{8}{5}$**

d) $9 \times \frac{1}{3}$ **3**

e) $4 \times \frac{4}{9}$ **$\frac{16}{9}$**

f) $10 \times \frac{3}{8}$ **$\frac{15}{4}$**

g) $\frac{8}{9} \times 6$ **$\frac{16}{3}$**

h) $\frac{2}{15} \times 3$ **$\frac{2}{5}$**

2) Work out the following, giving your answers in their simplest forms

a) $\frac{1}{2}$ of £40 **£20**

b) $\frac{1}{5}$ of 20 km **4 km**

c) $\frac{1}{4}$ of 120 kg **30 kg**

d) $\frac{1}{9}$ of £99 **£11**

e) $\frac{2}{5}$ of 30 cm **12 cm**

f) $\frac{7}{8}$ of £16 **£14**

g) $\frac{4}{7}$ of 7000 g **4000 g**

h) $\frac{3}{4}$ of £500 **£375**

3) Work out the following, giving your answers in their simplest forms

a) $3 \div \frac{1}{4}$ **12**

b) $7 \div \frac{1}{2}$ **14**

c) $12 \div \frac{1}{3}$ **36**

d) $9 \div \frac{1}{5}$ **45**

e) $10 \div \frac{2}{3}$ **15**

f) $8 \div \frac{4}{5}$ **10**

g) $3 \div \frac{5}{7}$ **$\frac{21}{5}$**

h) $15 \div \frac{2}{3}$ **$\frac{45}{2}$**

4) An industrial machine takes $\frac{3}{4}$ of an hour to produce a very special tool. How long would it take the machine to produce 12 of the tools? **9 hours**

5) A road is 20 km long. Road signs are to be installed every $\frac{2}{3}$ of a kilometre. How many signs will be needed?

30 signs, assuming that there isn't a sign at the beginning of the road.

N38 Rounding Significant Figures *Answers*

1) Round the following to 1 significant figure.

a) 478 cm — 500 cm

b) 450 cm — 500 cm

c) 449 cm — 400 cm

d) 12761 m — 10000 m

e) 28481 km — 30000 km

2) Round the following to 1 significant figure.

a) 673.8 cm — 700 cm

b) 4017.9 kg — 4000 kg

c) 246.83 m — 200 m

d) £45.38 — £50

e) 20482.1 kg — 20000 kg

3) Round the following to 1 significant figure.

a) 0.26 ml — 0.3 ml

b) 0.043 g — 0.04 g

c) 0.0671 m — 0.07 m

d) 0.000256 km — 0.0003 km

e) 0.3822 m — 0.4 m

4) Round the following to 1 significant figure.

a) 962 m — 1000 m

b) 0.923 cm — 0.9 cm

c) 0.971 cm — 1 cm

d) 0.096 km — 0.1 km

e) 0.00985 km — 0.01 km

5) Round the following to 1 significant figure.

a) £631428 — £600000

b) 0.00573 g — 0.006 g

c) £3614.68 — £4000

d) 0.493 ml — 0.5 ml

e) £968 — £1000

N39a Percentages
Change to a Percentage
Answers

1) Change the following to percentages:

a) 83 out of 100 83%

b) 24 out of 50 48%

c) 9 out of 25 36%

d) 7 out of 20 35%

e) 6 out of 10 60%

f) 72 out of 200 36%

g) 12 out of 40 30%

h) 36 out of 60 60%

2) Nas scores 24 out of 60 in a test.

What is his percentage score? 40%

3) Change the following to percentages, giving your answers to 1 decimal place:

a) 7 out of 24 29.2%

b) 35 out of 41 85.4%

c) 92 out of 143 64.3%

4) Jamie scores 48 out of 70 in his Science test and 38 out of 52 in his Maths test.

He says, “I did better in Science because 48 is a higher score than 38.”

Is he correct? Explain your answer.

He is not correct because
48 out of 70 is 68.6%
38 out of 52 is 73.1%
This shows that his Maths score is higher.

N39b Percentages Comparing Quantities *Answers*

1) A supermarket does a taste-test of cola.

40 people try cola A, 26 people like it.

50 people try cola B, 32 people like it.

Which cola was liked by the higher percentage of people?
You must show your working.

Cola A: 65%
Cola B: 64%
Cola A was liked by a higher percentage.

2) Leon does a spelling test and a times tables test.

He scores 7 out of 20 in the spelling test and 9 out of 25 in the times tables test.

In which test did he get the higher percentage score?
You must show your working.

Spelling test: 35%
Times tables test: 36%
Higher percentage score in times tables test.

3) In a survey carried out in the year 2000, 50 000 people were asked if they had a mobile phone. 26 000 did.

In a similar survey, carried out in the year 2014, 33 000 people were asked if they had a mobile phone. 22 000 did.

In which year did the higher percentage of people own a mobile phone?
You must show your working.

Year 2000: 52%
Year 2014: 67%
Higher percentage owned a phone in 2014.

A16 Trial and Improvement

Answers

All of the workings on this page are just examples of working you may have.
All of the actual answers are correct, though, and you must end up with these.

1) Using a trial and improvement method, solve the equation $x^2 - x = 56$

You must show ALL your working.

$x = 6$ $36 - 6 = 30$ Low
$x = 7$ $49 - 7 = 42$ Low
$x = 8$ $64 - 8 = 56$
Therefore, $x = 8$

2) Using a trial and improvement method, solve the equation $x^2 + 4x = 21$

You must show ALL your working.

$x = 1$ $1 + 4 = 5$ Low
$x = 4$ $16 + 16 = 32$ High
$x = 3$ $9 + 12 = 21$
Therefore, $x = 3$

3) Using a trial and improvement method, solve the equation $x^3 + 2x = 72$

You must show ALL your working.

$x = 2$ $8 + 4 = 12$ Low
$x = 5$ $125 + 10 = 135$ High
$x = 4$ $64 + 8 = 72$
Therefore, $x = 4$

4) Using a trial and improvement method, solve the equation $x^3 - 3x = 110$

You must show ALL your working.

$x = 4$ $64 - 12 = 52$ Low
$x = 5$ $125 - 15 = 110$
Therefore, $x = 5$

A17 Forming and Solving Basic equations *Answers*

1) Using the statement: *"I think of a number, double it, and subtract 1. I get 7."*

a) Form an equation. $2x - 1 = 7$

b) Solve the equation to find the number that was thought of. $x = 4$

2) Using the statement: *"I think of a number, multiply it by 7, and add 3. I get 80."*

a) Form an equation. $7x + 3 = 80$

b) Solve the equation to find the number that was thought of. $x = 11$

3) Using the statement: *"I think of a number, multiply it by 2, divide the result by 3 and then subtract 5. I get 5."*

a) Form an equation. $\frac{2x}{3} - 5 = 5$

b) Solve the equation to find the number that was thought of. $x = 15$

A18 Expanding Brackets Harder Questions *Answers*

1) Expand and simplify

a) $(x + 2)(x + 2)$ $x^2 + 4x + 4$

b) $(x + 3)(x + 5)$ $x^2 + 8x + 15$

c) $(x + 7)(x + 1)$ $x^2 + 8x + 7$

d) $(x + 4)(x + 3)$ $x^2 + 7x + 12$

e) $(x + 7)(x + 2)$ $x^2 + 9x + 14$

2) Expand and simplify

a) $(2x + 1)(3x + 2)$ $6x^2 + 7x + 2$

b) $(4x + 3)(2x + 1)$ $8x^2 + 10x + 3$

c) $(3x + 4)(3x + 2)$ $9x^2 + 18x + 8$

d) $(5x + 2)(5x + 7)$ $25x^2 + 45x + 14$

e) $(2x + 10)(2x + 4)$ $4x^2 + 28x + 40$

3) Expand and simplify

a) $(x + 5)(x – 3)$ $x^2 + 2x – 15$

b) $(x – 2)(x + 4)$ $x^2 + 2x – 8$

c) $(x – 6)(x – 2)$ $x^2 – 8x + 12$

d) $(x + 7)(x + 3)$ $x^2 + 10x + 21$

e) $(x – 8)(x – 2)$ $x^2 – 10x + 16$

4) Expand and simplify

a) $(2x – 1)(3x + 4)$ $6x^2 + 5x – 4$

b) $(5x – 2)(3x – 1)$ $15x^2 – 11x + 2$

c) $(3x + 4)(2x – 3)$ $6x^2 – x – 12$

d) $(5x – 1)(5x – 2)$ $25x^2 – 15x + 2$

e) $(4x + 2)(3x – 5)$ $12x^2 – 14x – 10$

5) Expand and simplify

a) $(x + 5)^2$ $x^2 + 10x + 25$

b) $(x – 2)^2$ $x^2 – 4x + 4$

c) $(2x + 3)^2$ $4x^2 + 12x + 9$

d) $(3x – 1)^2$ $9x^2 – 6x + 1$

e) $(4x + 3)^2$ $16x^2 + 24x + 9$

A19a/b Solving Harder Equations

Answers

1) Solve the following

a) $2x + 3 = 19$ $x = 8$

b) $3x - 2 = 13$ $x = 5$

c) $5x - 1 = 9$ $x = 2$

d) $3 + 2x = 23$ $x = 10$

e) $12 - 3x = 9$ $x = 1$

2) Solve the following

a) $2(3x - 1) = 22$ $x = 4$

b) $3(x + 7) = 18$ $x = -1$

c) $4(5x - 2) = 12$ $x = 1$

d) $66 = 6(2x + 3)$ $x = 4$

e) $20 = 5(x - 6)$ $x = 10$

3) Solve the following

a) $\frac{x - 6}{2} = 3$ $x = 12$

b) $\frac{x + 8}{3} = 5$ $x = 7$

c) $\frac{2x - 1}{3} = 5$ $x = 8$

d) $\frac{6x + 1}{2} = 8$ $x = 2.5$

e) $\frac{7x - 3}{5} = 5$ $x = 4$

4) Solve the following

a) $2x + 7 = x + 12$ $x = 5$

b) $4x - 5 = 2x + 3$ $x = 4$

c) $7x + 2 = 3x + 26$ $x = 6$

d) $6x - 7 = 4x - 5$ $x = 1$

e) $3x + 4 = x - 7$ $x = -5.5$

5) Solve the following

a) $x - 6 = 2x - 13$ $x = 7$

b) $3x + 4 = 5x - 8$ $x = 6$

c) $4x + 17 = x - 4$ $x = -7$

d) $5 - 2x = x - 7$ $x = 4$

e) $2x - 1 = 14 - 3x$ $x = 3$

6) Solve the following

a) $2(3x - 1) = 4x + 7$ $x = 4.5$

b) $3(x + 4) = 2(x - 5)$ $x = -22$

c) $5(2x - 3) = 3(3x + 4)$ $x = 27$

d) $2(2x - 1) = 5(2x - 4)$ $x = 3$

e) $2(2x + 3) = 5(x + 3)$ $x = -9$

7) Solve the following

a) $\frac{2(x + 1)}{3} = 6$ $x = 8$

b) $\frac{4(2x - 3)}{5} = 4$ $x = 4$

c) $\frac{2(4x - 5)}{3} = x + 10$ $x = 8$

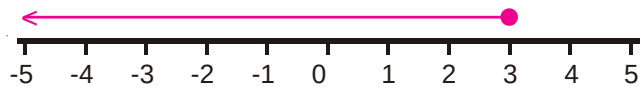
d) $\frac{3(5x + 4)}{2} = 7x - 8$ $x = -28$

e) $4 - x = \frac{2(x + 7)}{3}$ $x = -\frac{2}{5}$

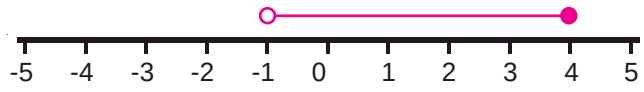
A20a Inequalities Introduction *Answers*

1) Represent the inequalities on the number lines.

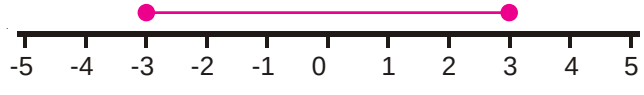
a) $x \leq 3$



b) $-1 < x \leq 4$

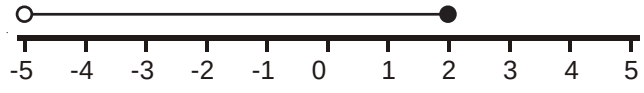


c) $-3 \leq x \leq 3$

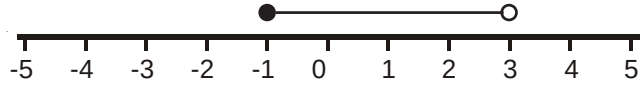


2) Write down the inequalities shown below

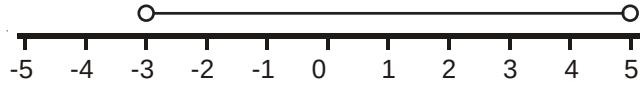
a) $-5 < x \leq 2$



b) $-1 \leq x < 3$



c) $-3 < x < 5$



3) If x is an integer, what are the possible values of x?

a) $-4 \leq x \leq 2$ -4, -3, -2, -1, 0, 1, 2

b) $-3 \leq x < 1$ -3, -2, -1, 0

c) $1 < x \leq 5$ 2, 3, 4, 5

d) $-3 < x \leq 4$ -2, -1, 0, 1, 2, 3, 4

e) $-7 \leq x \leq -4$ -7, -6, -5, -4

A20b Inequalities Solving *Answers*

1) Solve

a) $2x - 1 \geq 7$ $x \geq 4$

b) $3x + 4 < 19$ $x < 5$

c) $5x - 7 \leq 18$ $x \leq 5$

d) $2x + 9 > 5$ $x > -2$

e) $4x + 11 \leq 14$ $x \leq 0.75$

2) Solve

a) $\frac{x}{3} < 7$ $x < 21$

b) $\frac{x}{5} - 1 \geq 3$ $x \geq 20$

c) $\frac{2x}{3} + 4 \leq 9$ $x \leq 7.5$

d) $12 \geq 2x - 1$ $x \leq 6.5$

e) $20 < 5 + 5x$ $x > 3$

3) Solve

a) $2(5x - 1) \leq 18$ $x \leq 2$

b) $3(4x + 2) > 60$ $x > 4.5$

c) $42 > 2(6x + 15)$ $x < 1$

d) $4(1 + x) \leq 12$ $x \leq 2$

e) $8(2x - 1) > 12$ $x > 1.25$

4) Solve

a) $2x + 7 \leq x + 9$ $x \leq 2$

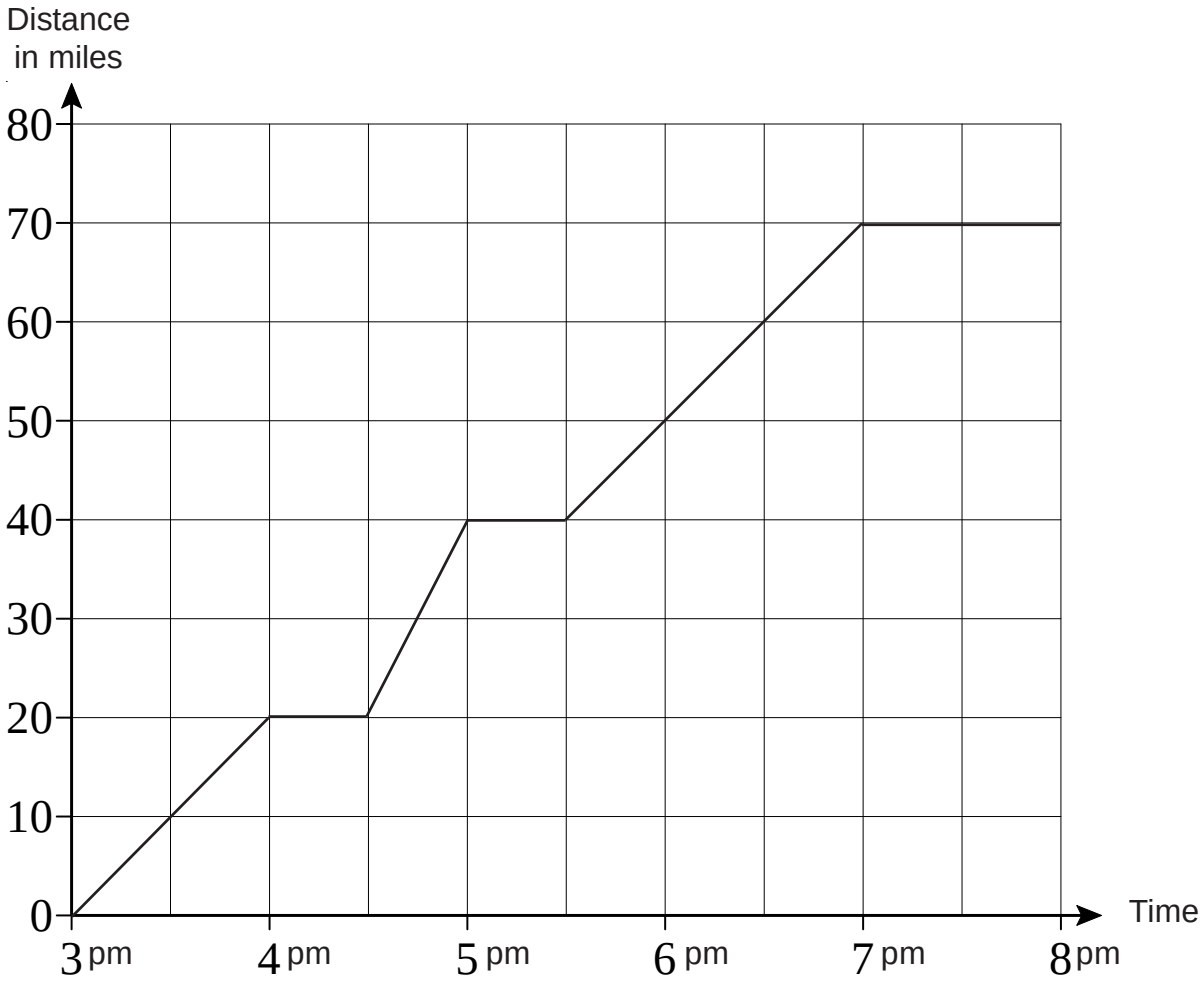
b) $x - 6 > 3x - 18$ $x < 6$

c) $4x + 3 < 2x - 9$ $x < -6$

d) $2x - 4 \geq 7x - 34$ $x \leq 6$

e) $2(x + 3) < x - 1$ $x < -7$

A21a Real-Life Graphs Distance-Time *Answers*



The graph, above, shows Jade's journey by scooter from her house to university with some stops along the way.

a) How long did the journey take? **4 hours**

b) How many breaks did Jade take throughout her journey? **2**

c) At what time did Jade take her first break? **4 pm**

d) How long did the first break last? **30 minutes**

e) What was Jade's average speed between 3 pm and 4 pm? **20 mph**

f) What was Jade's average speed between 4.30 pm and 5 pm? **40 mph**

g) What was Jade's average speed between 5.30 pm and 7 pm? **20 mph**

A21b Real-Life Graphs Other Types *Answers*

1) Use the conversion graph below to convert :

a) 80 km to miles **50**

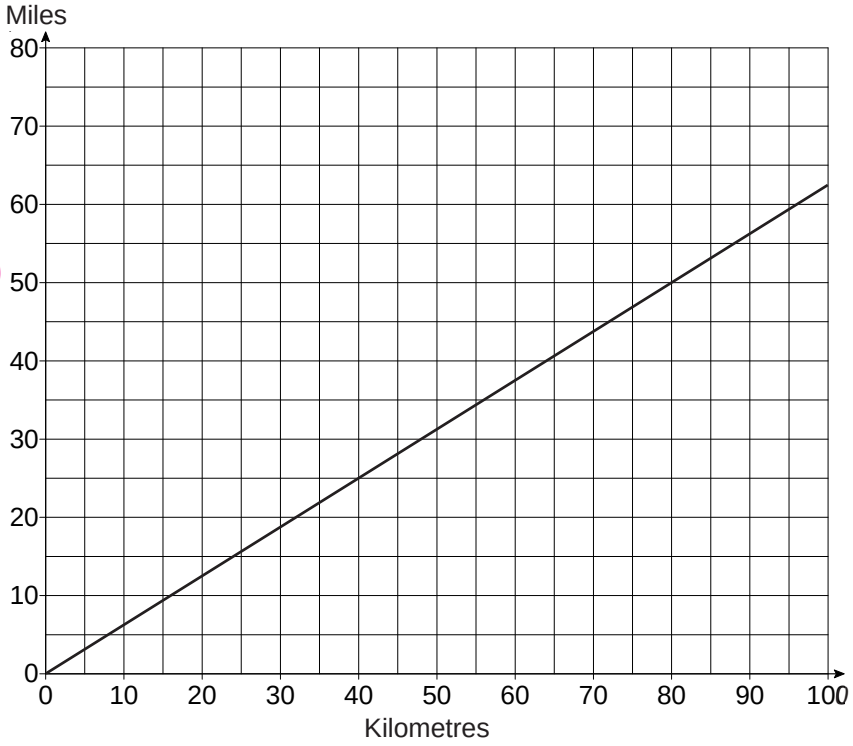
b) 35 miles to km **56**

c) 40 km to miles **25**

d) 60 miles to km **96**

e) 100 miles to km **160**

f) 140 km to miles **86**

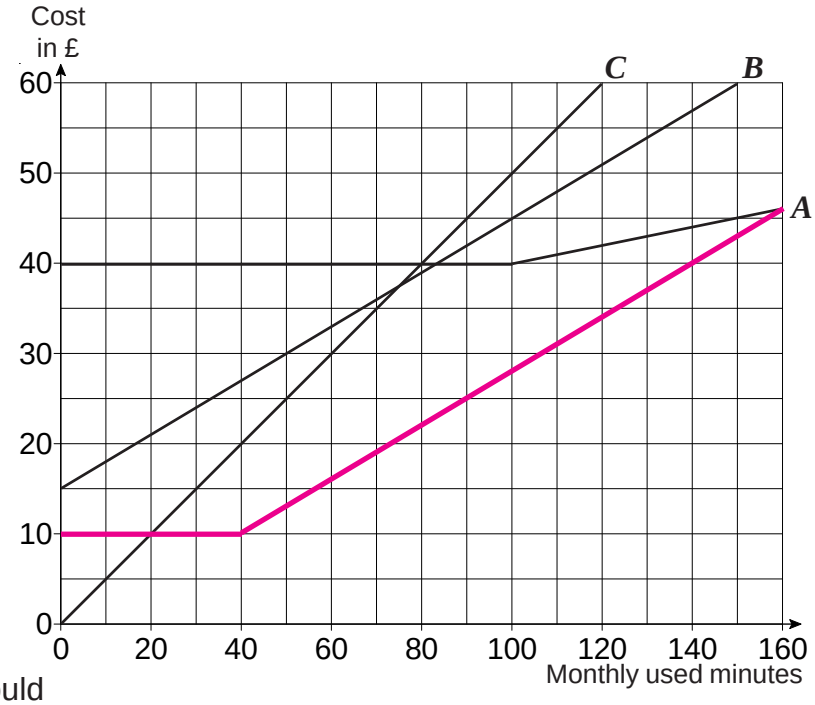


2) The graph below shows three different mobile phone tariffs.

Tariff 1
Pay as you go
50p per minute.

Tariff 2
£15 per month and
30p per minute

Tariff 3
£40 per month,
100 free minutes then
10p per minute



T1 is C T2 is B T3 is A

a) Match each tariff with its graph, A, B or C

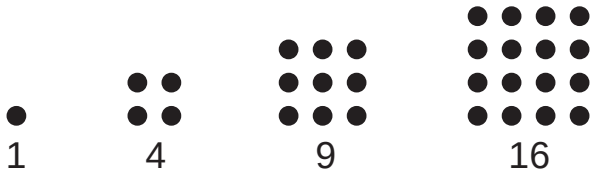
b) Every month, James needs about 90 mins talk time.
Work out which tariff would be best for him. Explain your answer. **T3 is best because it costs £40.**

c) Tariff 4 is announced. This is £10 per month, 40 free minutes then 30p per minute.
Draw a line on the graph to show this tariff.

A22 Special Sequences

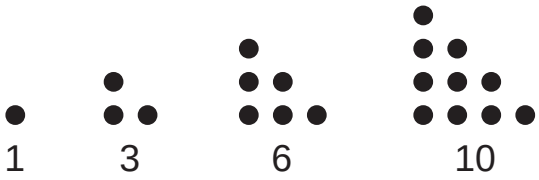
Answers

1) Here is a pattern of square numbers:



What are the next two numbers in the pattern? 25, 36

2) Here is the pattern of triangular numbers:



What are the next three numbers in the pattern? 15, 21, 28

3) Here is part of a Fibonacci sequence:

5, 8, 13, 21, 34

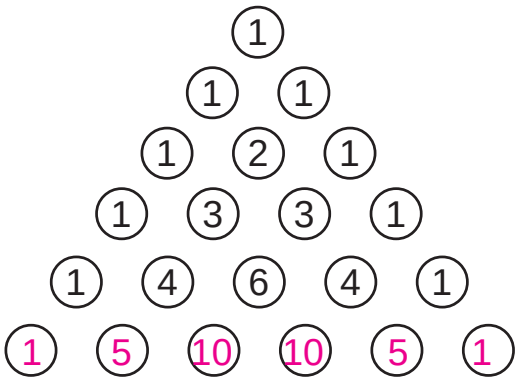
What are the next three numbers in the sequence? 55, 89, 144

4) Here is part of a number pattern:

3, 4, 6, 9, 13

What are the next three numbers in the pattern? 18, 24, 31

5) Can you work out a rule and fill in the bottom row?



A23a/b Quadratic Sequences

Answers

1) Find the *n*th term of

a) 1, 4, 9, 16, 25, ... n^2

b) 2, 5, 10, 17, 26, ... $n^2 + 1$

c) 0, 3, 8, 15, 24, ... $n^2 - 1$

2) Find the *n*th term of

a) 1, 4, 9, 16, 25, ... n^2

b) 2, 8, 18, 32, 50, ... $2n^2$

c) 0.5, 2, 4.5, 8, 12.5, ... $0.5n^2$

3) Find the *n*th term of

a) 3, 9, 19, 33, 51, ... $2n^2 + 1$

b) 1, 7, 17, 31, 49, ... $2n^2 - 1$

c) 11, 41, 91, 161, 251, ... $10n^2 + 1$

4) For the following *n*th terms,
find the first three terms and the tenth term

a) $n^2 + 4$ 5, 8, 13, ... 104

b) $n^2 - 3$ -2, 1, 6, ... 97

c) $n^2 + 10$ 11, 14, 19, ... 110

d) $n^2 + 2n$ 3, 8, 15, ... 120

e) $n^2 - n$ 0, 2, 6, ... 90

5) For the following *n*th terms,
find the first three terms and the tenth term

a) $4n^2$ 4, 16, 36, ... 400

b) $2n^2 + 3n$ 5, 14, 27, ... 230

c) $3n^2 - 2n$ 1, 8, 21, ... 280

d) $n^2 + n + 1$ 3, 7, 13, ... 111

e) $2n^2 + 4n - 3$ 3, 13, 27, ... 237

Simultaneous Equations

A24a/b

Answers

1) a) Complete the table of values for $y = x + 2$

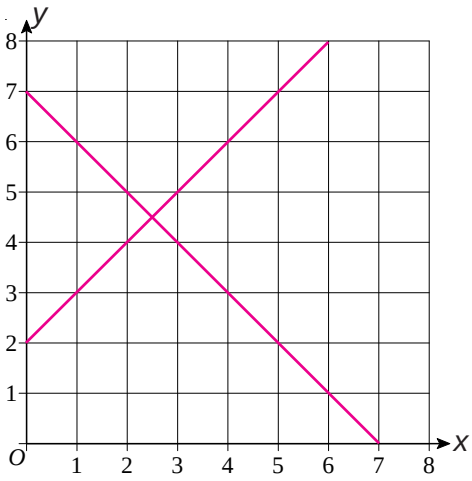
x	0	1	2	3	4
y	2	3	4	5	6

b) Draw the graph of $y = x + 2$

c) Complete the table of values for $x + y = 7$

x	0	1	2	3	4
y	7	6	5	4	3

d) Draw the graph of $x + y = 7$



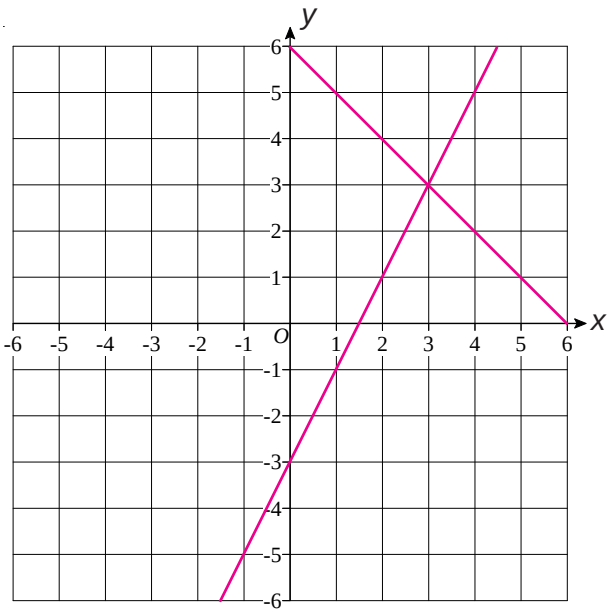
e) Use your graph to solve the simultaneous equations $y = x + 2$ and $x + y = 7$

$x = 2.5,\ y = 4.5$

2) Using a graphical method, solve the simultaneous equations

$y = 2x - 3$ and $y = 6 - x$

$x = 3,\ y = 3$



3) Solve the simultaneous equations $y = x + 6$ and $y = 3 - x$ $x = -1.5,\ y = 4.5$

4) Solve the simultaneous equations $y = x - 14$ and $y = 2 - 3x$ $x = 4,\ y = -10$

R9a Increase/Decrease by a Percentage - Basics *Answers*

1) Describe how you would increase a number by 10%.
Find 10% of the number and add it on.

2) Describe how you would decrease a number by 10%.
Find 10% of the number and take it away.

3) Increase the following numbers by 10%

a)	40	**44**	e)	75	**82.5**
b)	140	**154**	f)	505	**555.5**
c)	810	**891**	g)	12	**13.2**
d)	320	**352**	h)	123	**135.3**

4) Decrease the following numbers by 10%

a)	20	**18**	e)	25	**22.5**
b)	160	**144**	f)	445	**400.5**
c)	80	**72**	g)	13	**11.7**
d)	190	**171**	h)	7	**6.3**

5) Work out the following:

a)	Increase £400 by 5%	**£420**	e)	Increase 250 m by 50%	**375 m**
b)	Decrease £120 by 15%	**£102**	f)	Decrease £820 by 75%	**£205**
c)	Decrease 500 km by 20%	**400 km**	g)	Increase 60 kg by 60%	**96 kg**
d)	Increase 96 kg by 10%	**105.6 kg**	h)	Decrease £26 by 35%	**£16.9**

6) A shop is having a sale and all prices are reduced by 25%.

a) Work out the sale price of an item normally priced at £18.40 **£13.80**

b) Work out the sale price of an item normally priced at £99 **£74.25**

R9b Increase/Decrease by a Percentage - Multiplier *Answers*

1) a) Increase £400 by 16% £464

b) Increase £750 by 24% £930

c) Increase £2000 by 38% £2760

d) Increase £14500 by 19% £17255

e) Increase £16.50 by 30% £21.45

2) a) Decrease £700 by 32% £476

b) Decrease £36 by 14% £30.96

c) Decrease £1970 by 40% £1182

d) Decrease £3000 by 12.5% £2625

e) Decrease £3124 by 16.25% £2616.35

3) A sports shop reduces the price of all its trainers by 15% in the Spring sale.
Before the sale, one pair of trainers cost £74.
How much are they after the reduction? £62.90

4) Tim took up weightlifting.
In his first session he could bench-press 45 kg.
Four weeks later he could bench-press 22% more.
How much could he now lift to the nearest kg? 55 kg

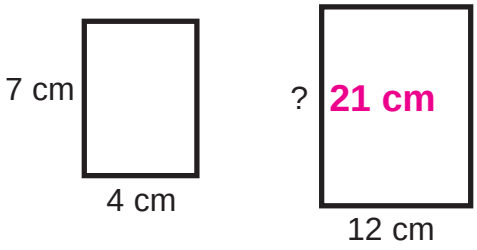
5) If a manager of a shop reduces the price of a £1500 piano by 15% and then, four weeks later, increases the reduced price by 15%, how much does it now cost? £1466.25

R10 Scale Factors Similar Shapes *Answers*

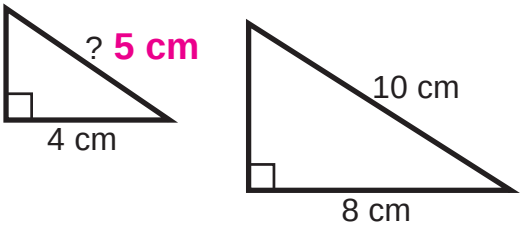
1) In each of the following questions, the two shapes are mathematically similar.

Work out the lengths of the missing sides.

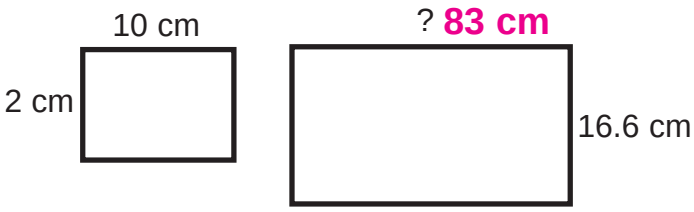
a)



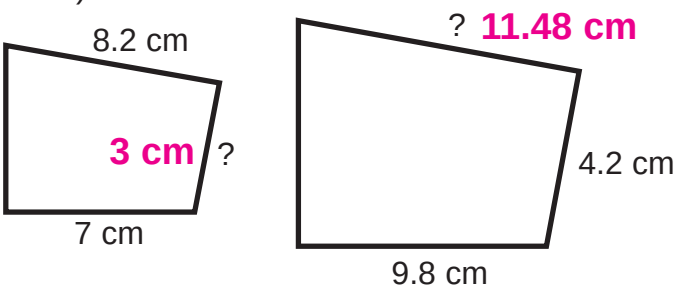
b)



c)

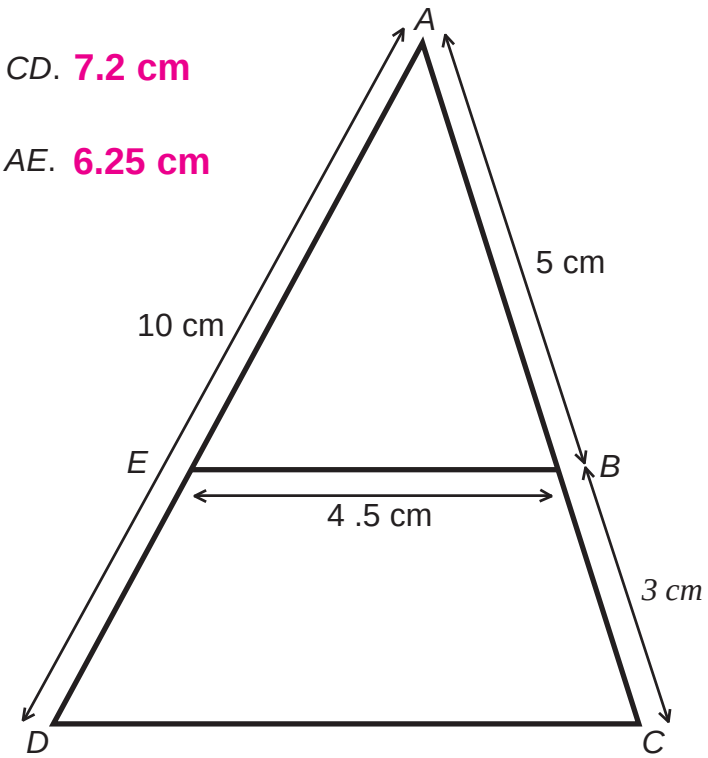


d)



2) a) Work out the length of *CD*. **7.2 cm**

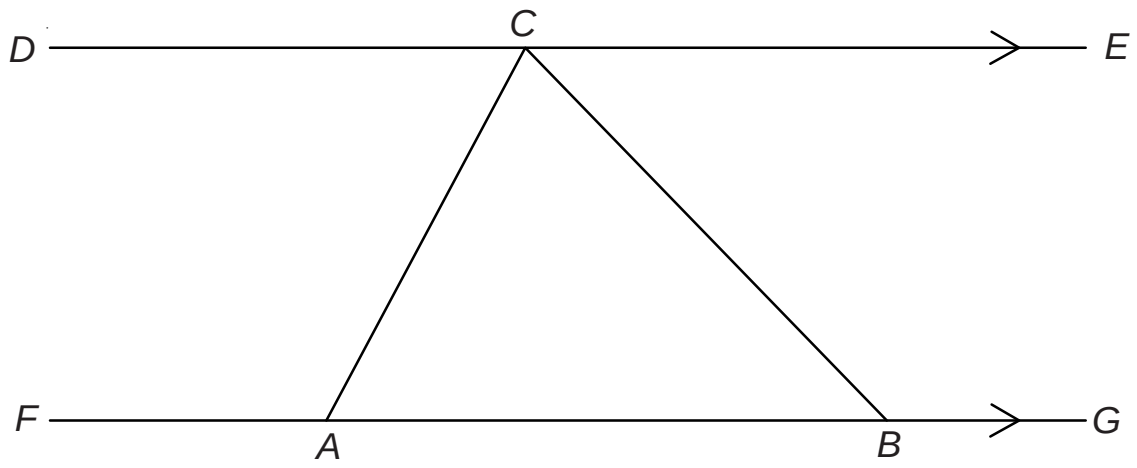
b) Work out the length of *AE*. **6.25 cm**



G23 Angles in a Triangle Proof

Answers

Fill in the missing parts:



Angle *DCA* is equal to angle *CAB* because they are alternate angles

Angle *ECB* is equal to angle *CBA* because they are alternate angles

Angle *ACB* is in triangle *ABC* and on straight line *DCE*.

Angles *DCA*, *ACB*, and *ECB* lie on a straight line so they must add up to 180°

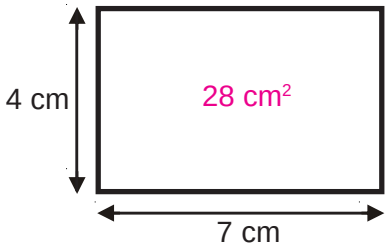
Therefore, angles *CAB*, *CBA*, and *ACB* must also add up to 180°

The angles in a triangle add up to 180°

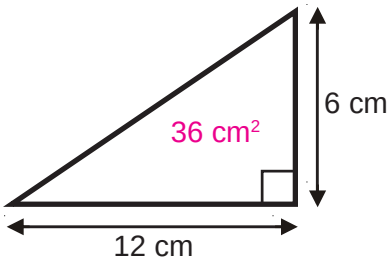
G24 Area Composite Shapes *Answers*

1) Find the areas of the following shapes:

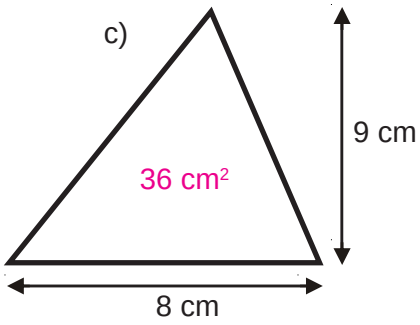
a)



b)

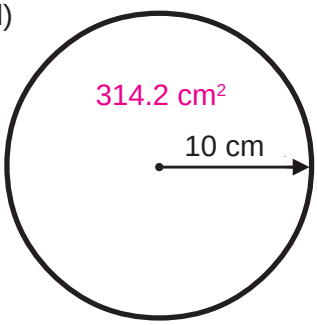


c)

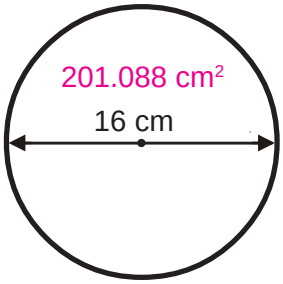


Take π to be 3.142

d)

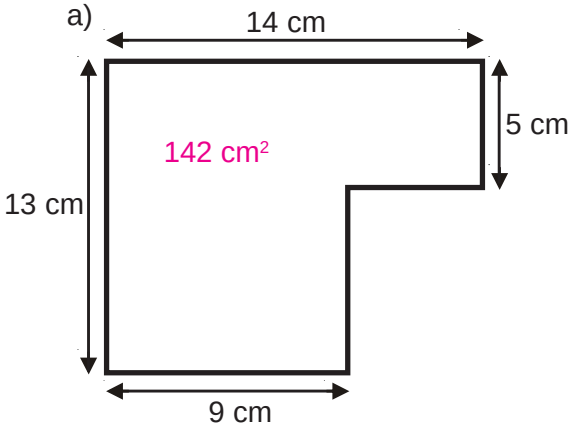


e)

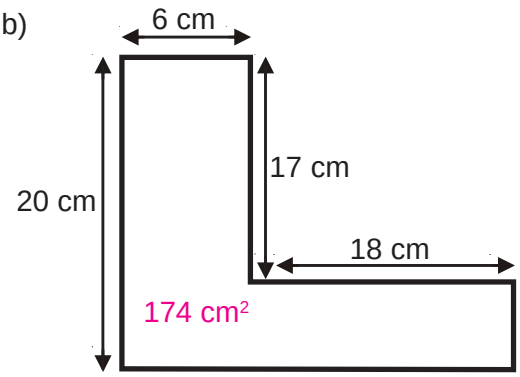


2) Find the areas of the following shapes:

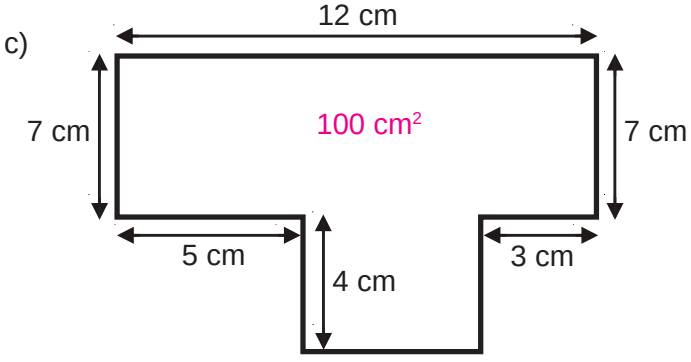
a)



b)



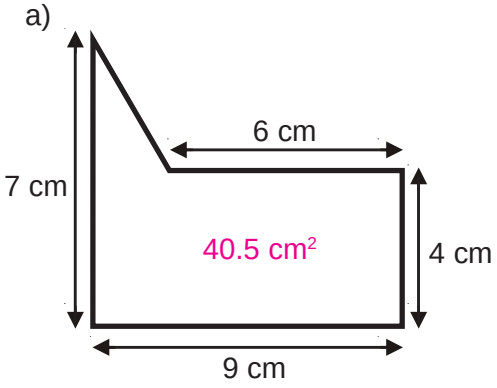
c)



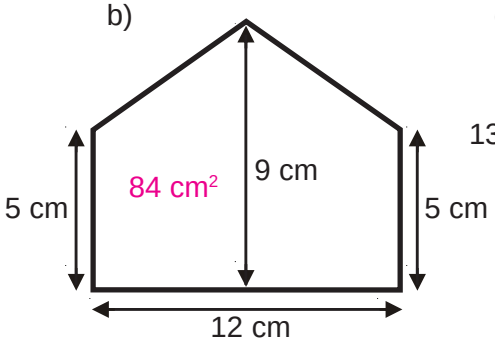
G24 Area Composite Shapes *Answers*

1) Find the areas of the following shapes:

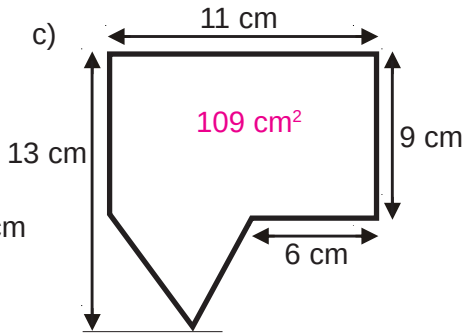
a)



b)

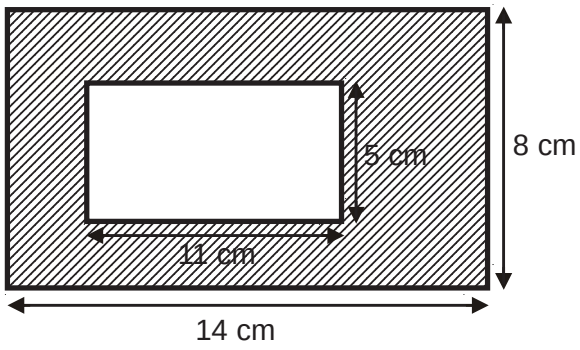


c)

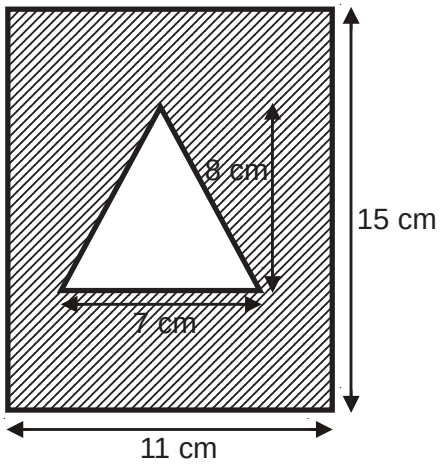


2) Find the areas of the shaded parts of the following:
Take π to be 3.142 when needed.

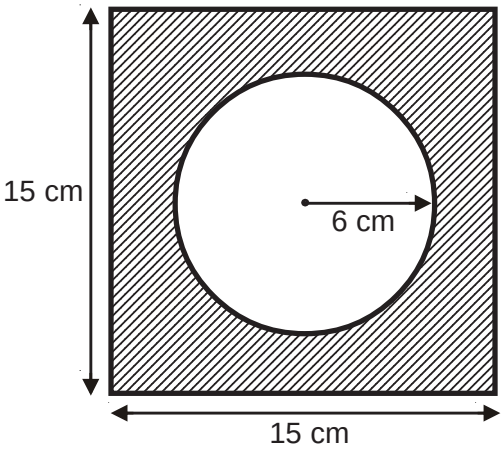
a) 57 cm²



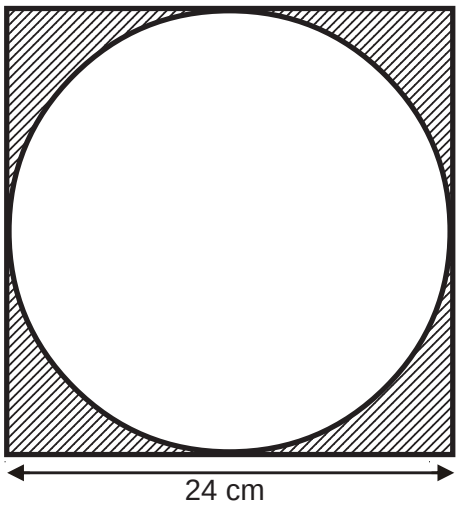
b) 137 cm²



c) 111.888 cm²



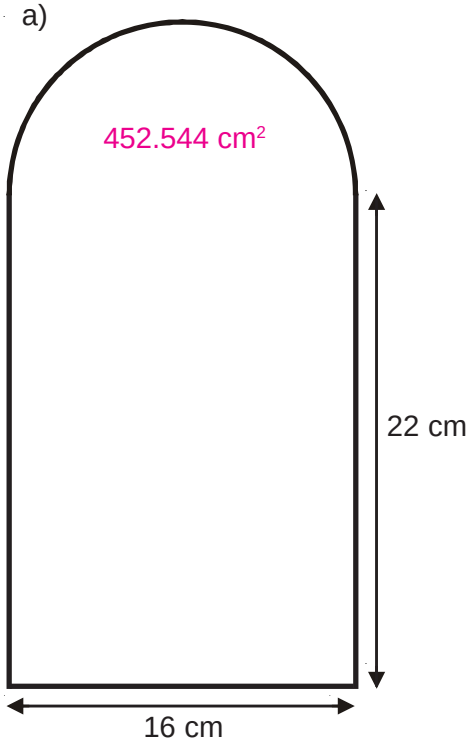
d) 123.552 cm²



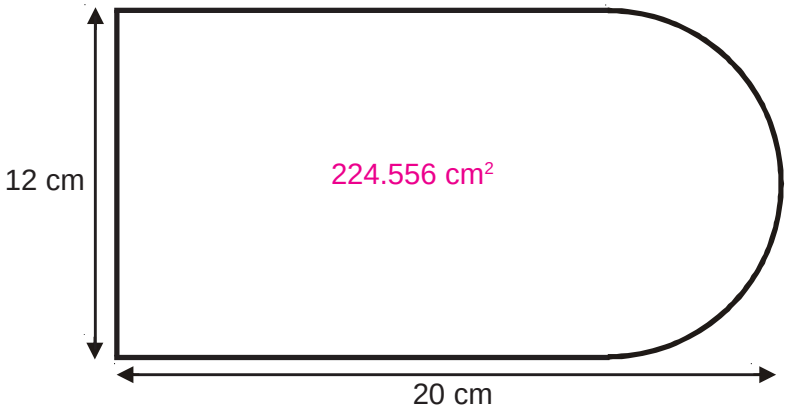
G24 Area Composite Shapes *Answers*

Find the areas of the shapes below:
Take π to be 3.142

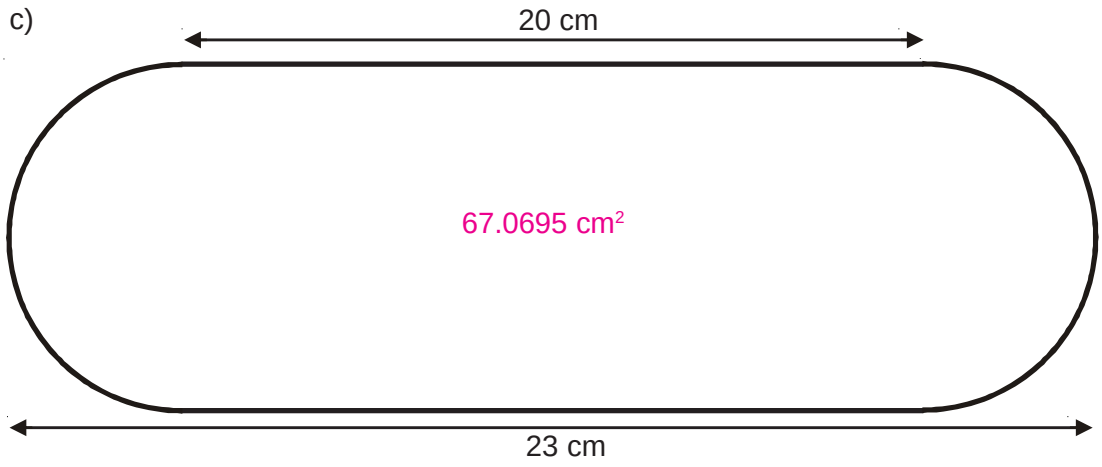
a)



b)



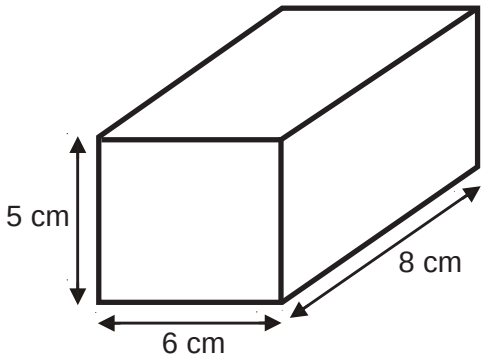
c)



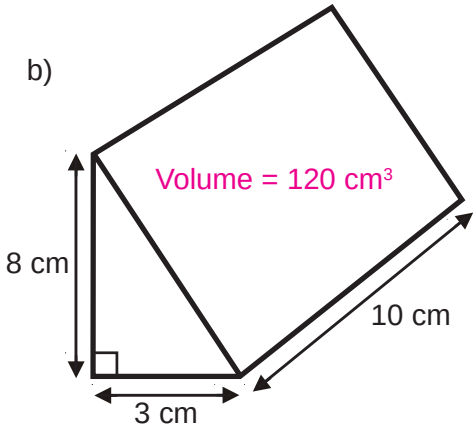
G25a Prisms Volume *Answers*

Find the volumes of the prisms, below.
Take π to be 3.142 for questions c and d.

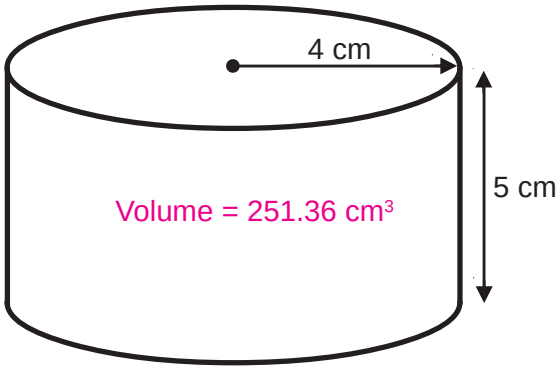
a) Volume = 240 cm^3



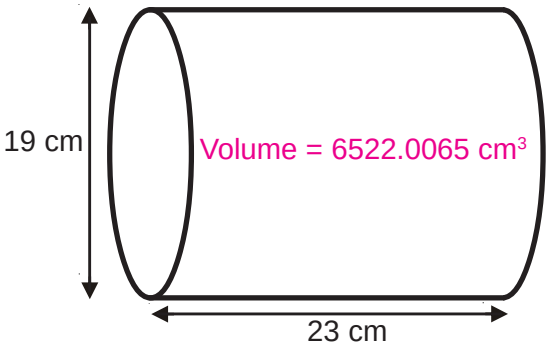
b)



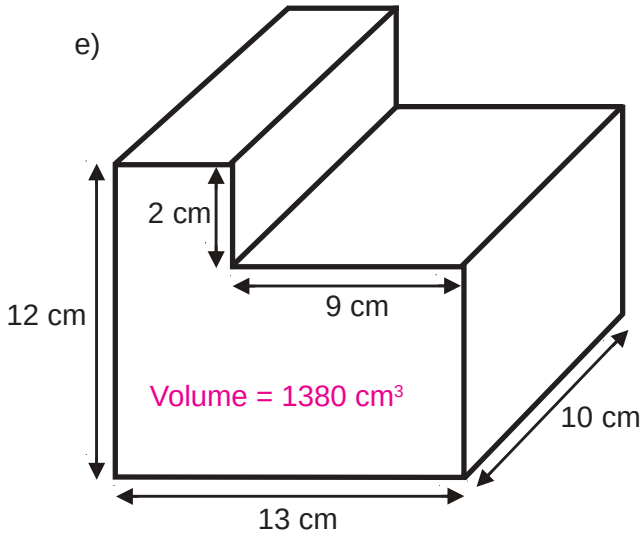
c)



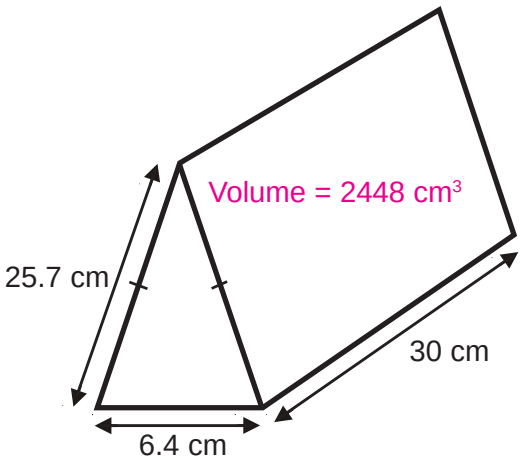
d)



e)



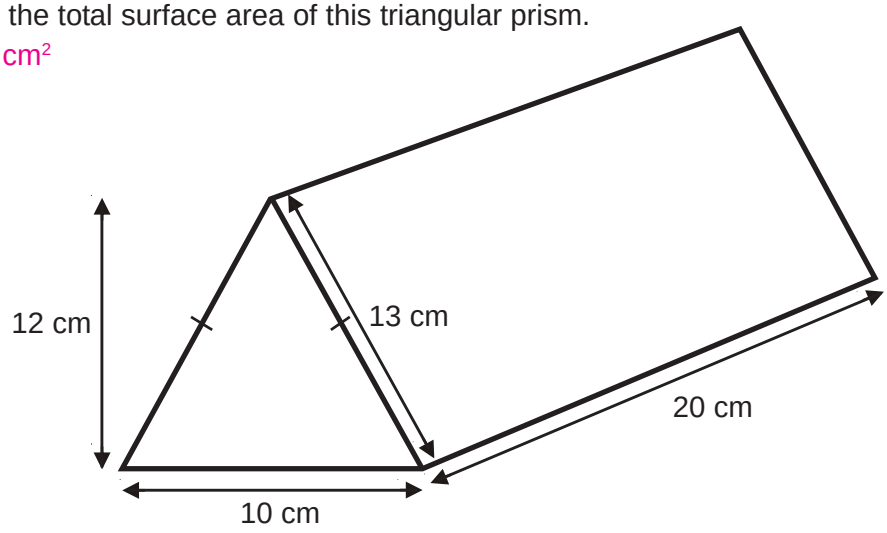
f)



G25b Prisms Surface Area *Answers*

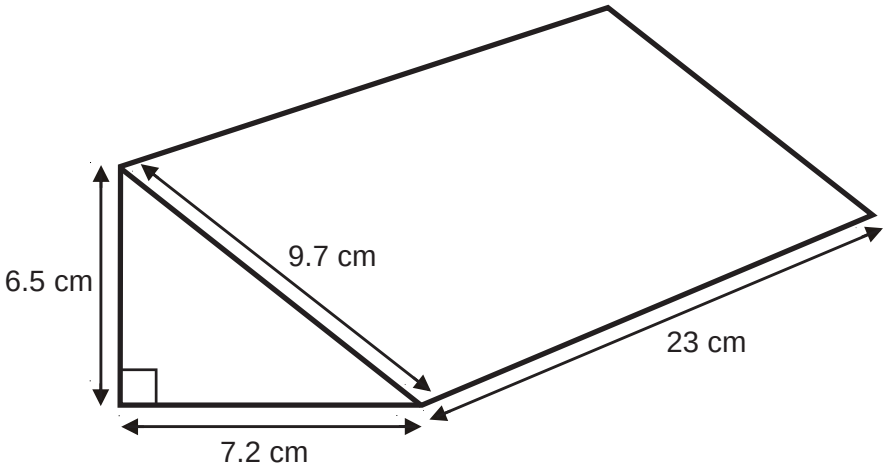
1) Find the total surface area of this triangular prism.

840 cm^2



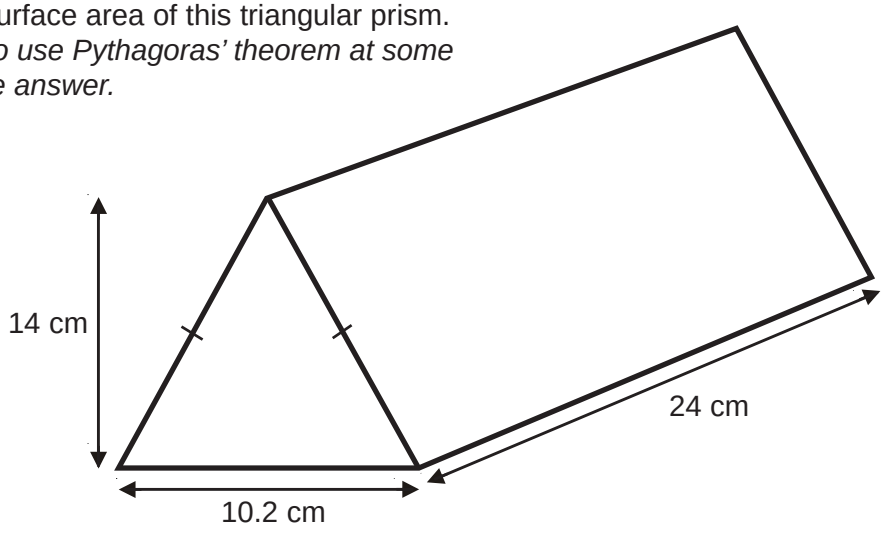
2) Find the total surface area of this triangular prism.

585 cm^2



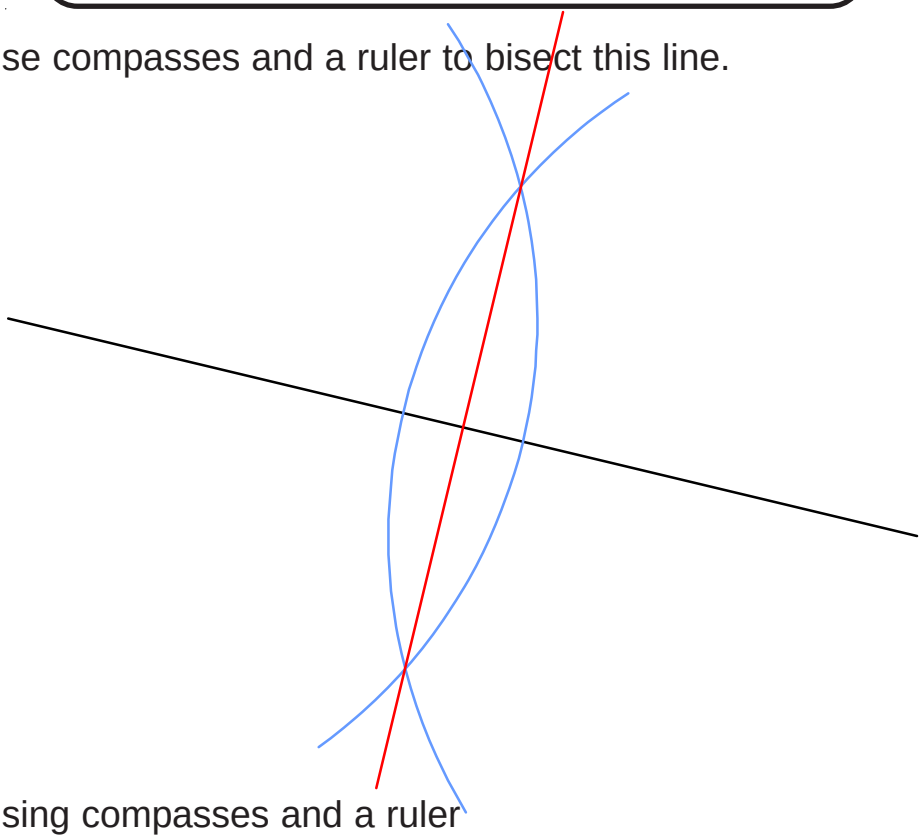
3) Find the total surface area of this triangular prism.
You will need to use Pythagoras' theorem at some stage to get the answer.

1102.8 cm^2



G26a Constructions
Bisecting a Line
Answers

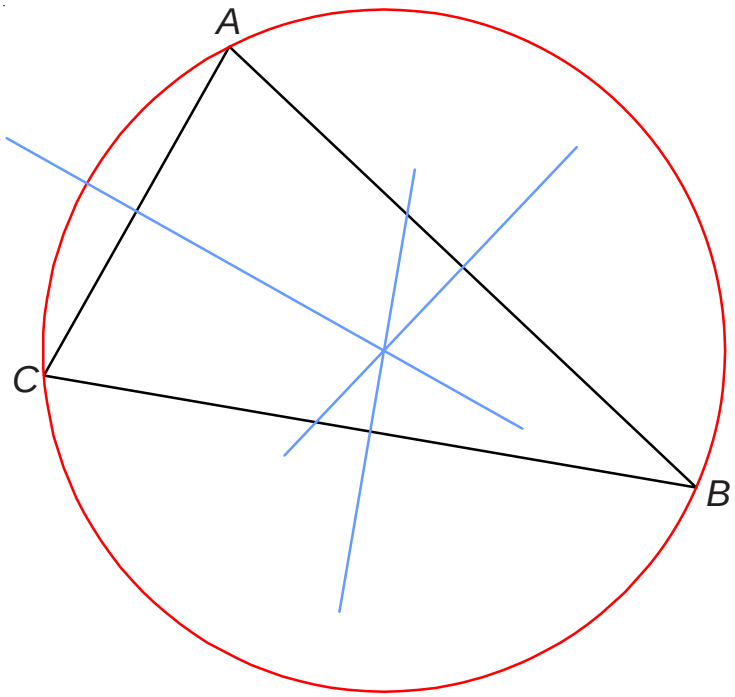
1) Use compasses and a ruler to bisect this line.



2) Using compasses and a ruler

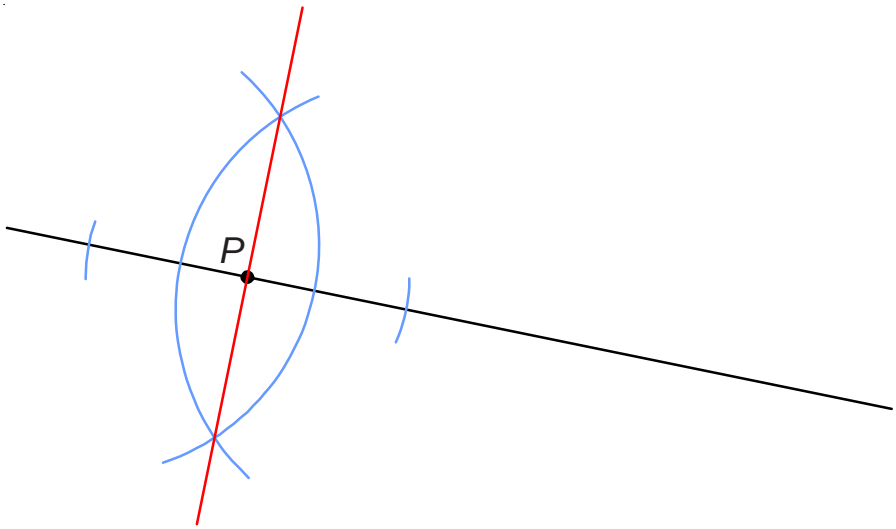
a) Bisect lines *AB*, *BC* and *AC*.

b) Place your compass point where your three lines cross and open them out until your pencil is touching *A*.
Draw a circle.

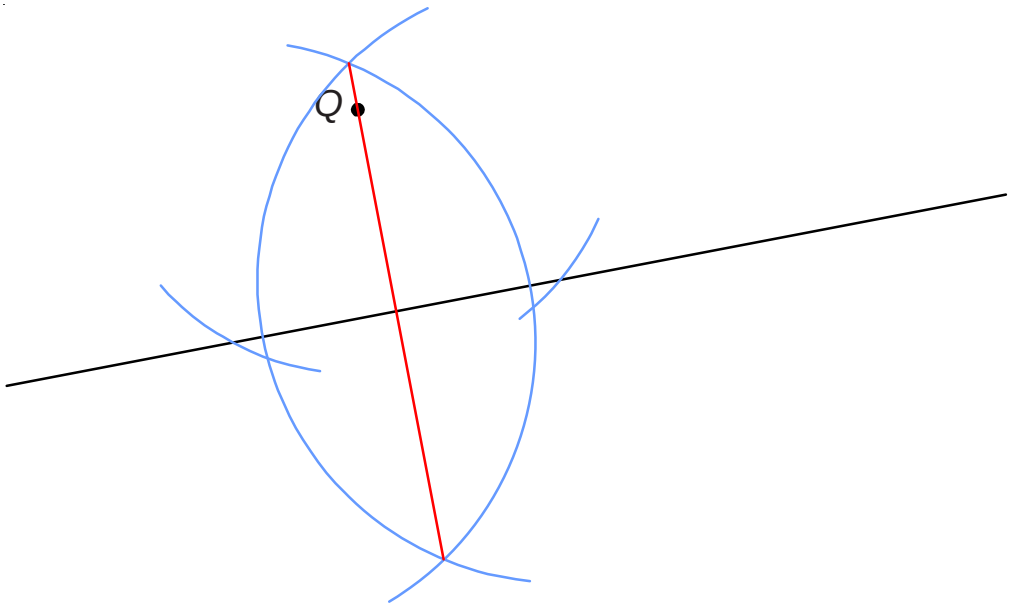


G26b Constructions Perpendiculars *Answers*

1) Using compasses and a ruler, construct a perpendicular to the line at the point *P*.

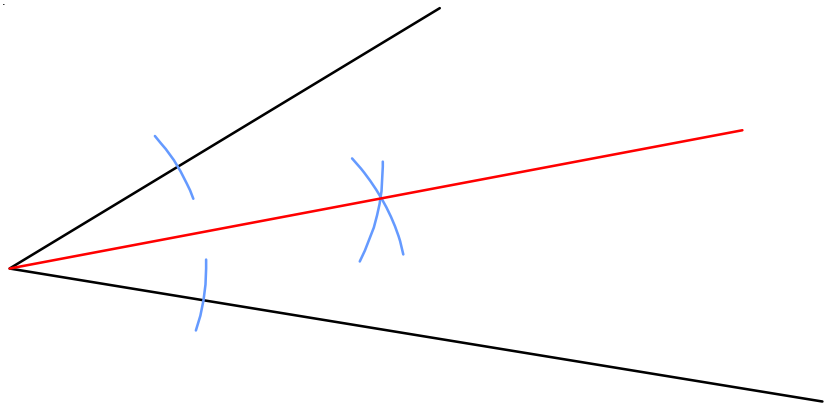


2) Using compasses and a ruler, construct a perpendicular to the line from the point *Q*.



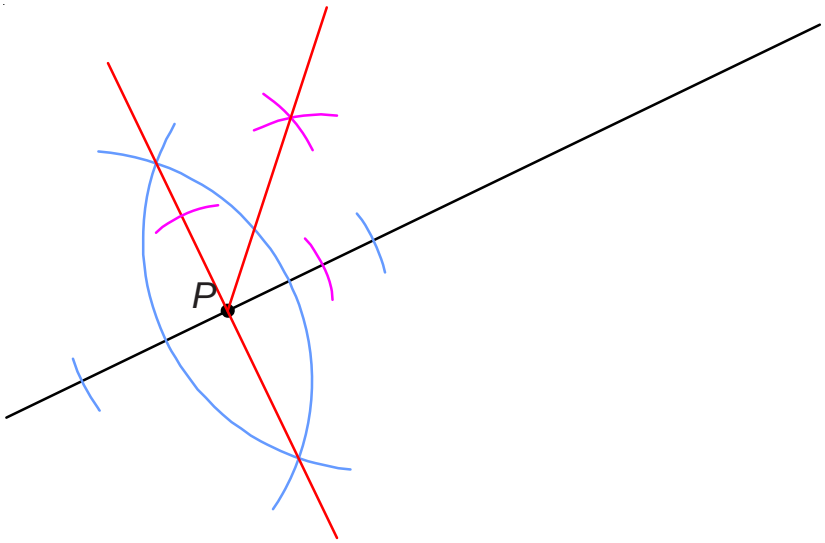
G26c Constructions Bisecting an Angle *Answers*

1) Using compasses and a ruler, bisect this angle.



2) Using compasses and a ruler,

a) Construct a perpendicular to the line at the point *P*.



b) Bisect the angle where your perpendicular meets line *AB*.

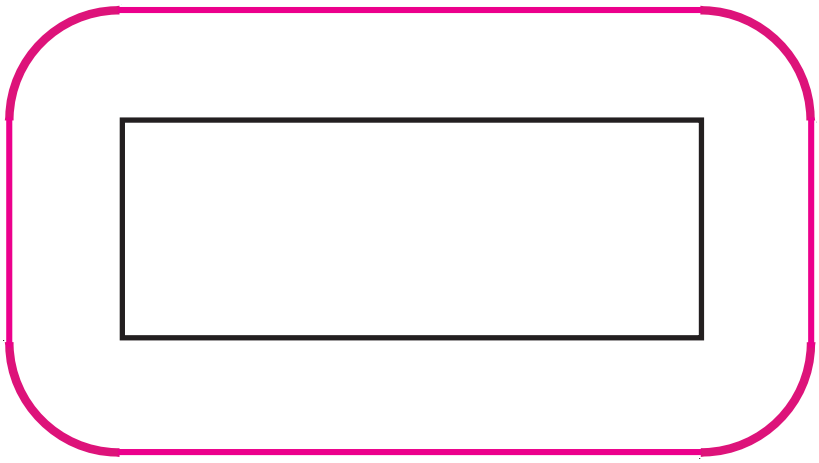
c) What size is the angle you have just constructed? 45°

G27 Loci

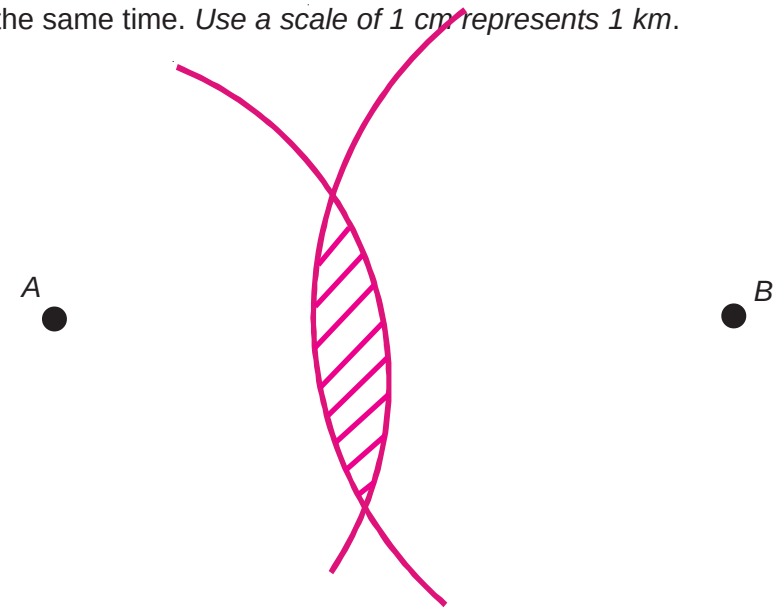
Answers

1) Draw the locus of all the points that are 1.2 cm away from the line *AB*.

2) Draw the locus of all the points that are 1.5 cm away from the rectangle *ABCD*.



3) Radio signals can be heard within a 4.5 km radius of transmitter *A* and a 5.5 km radius of transmitter *B*. Show, by shading, the area where radio signals can be heard from both transmitters at the same time. *Use a scale of 1 cm represents 1 km*.

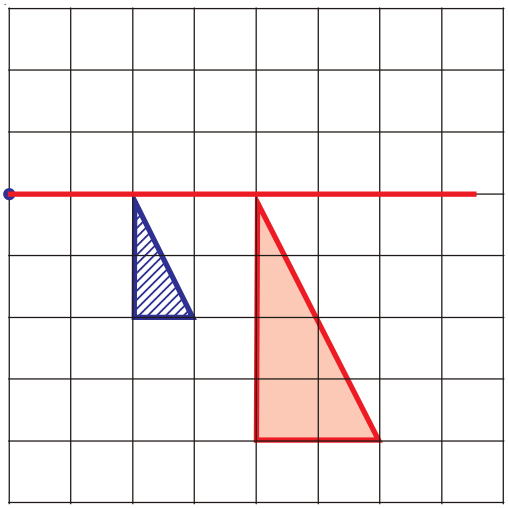


G28 Enlargement

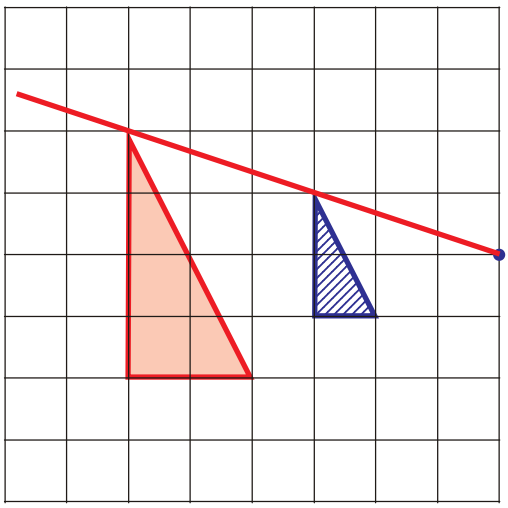
Answers

Enlarge the following shapes with scale factor 2, using the dot as the centre of enlargement.

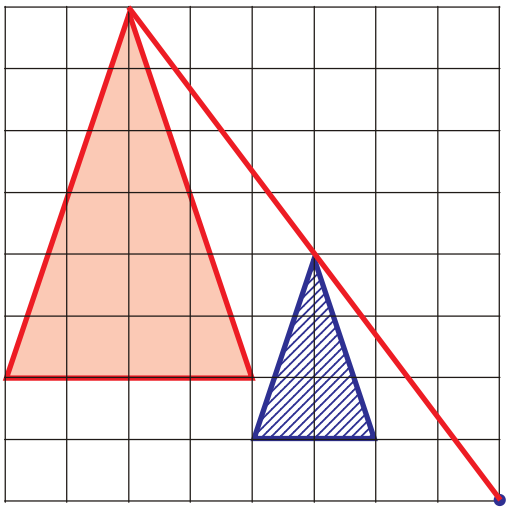
a)



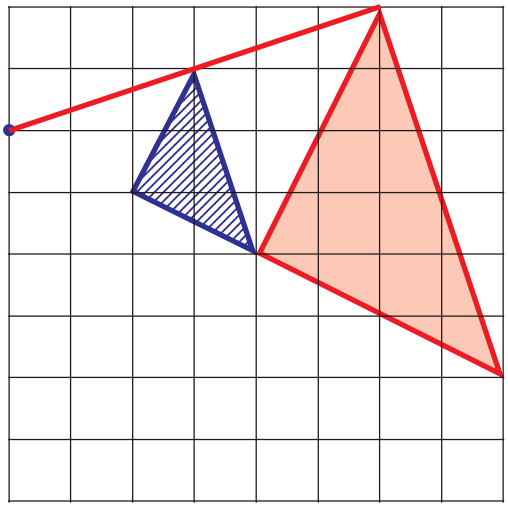
b)



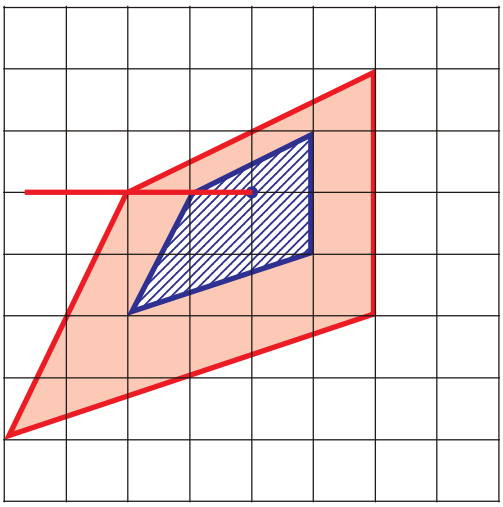
c)



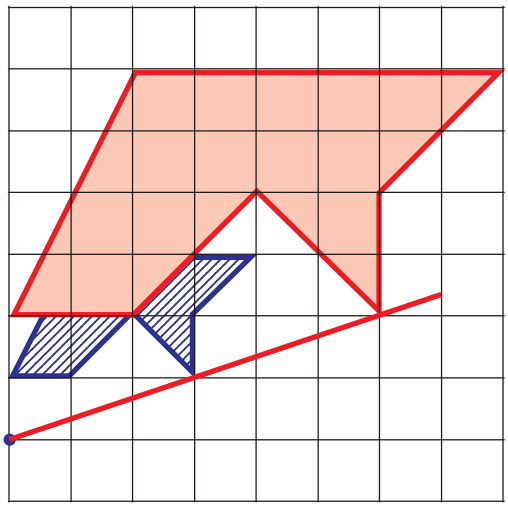
d)



e)



f)

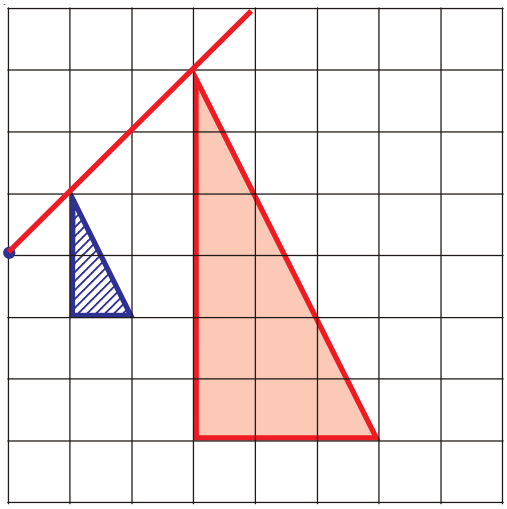


G28 Enlargement

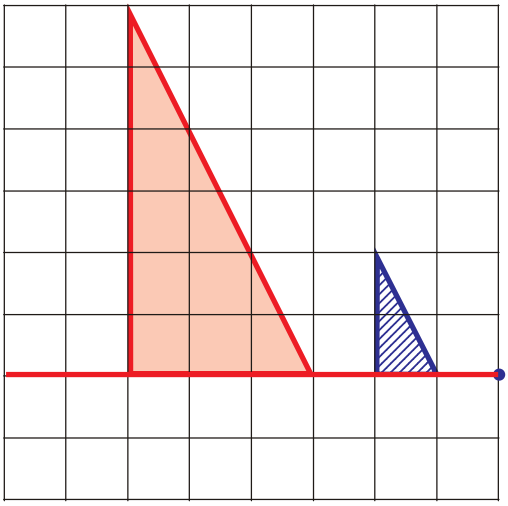
Answers

1) Enlarge the following shapes using the dots as the centres of enlargement.

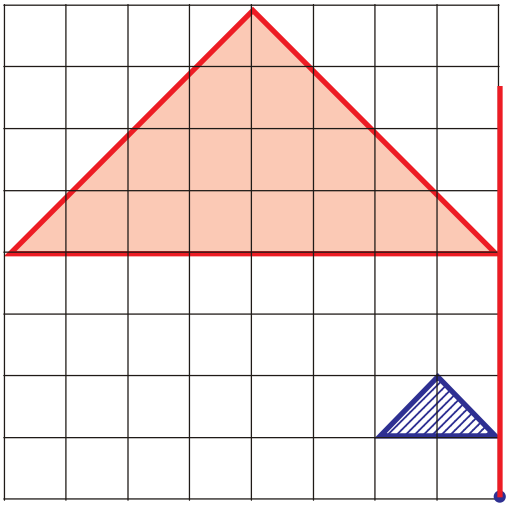
a) Scale factor 3



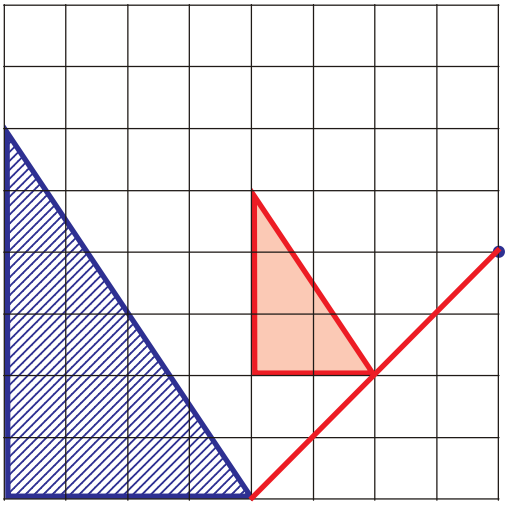
b) Scale factor 3



c) Scale factor 4

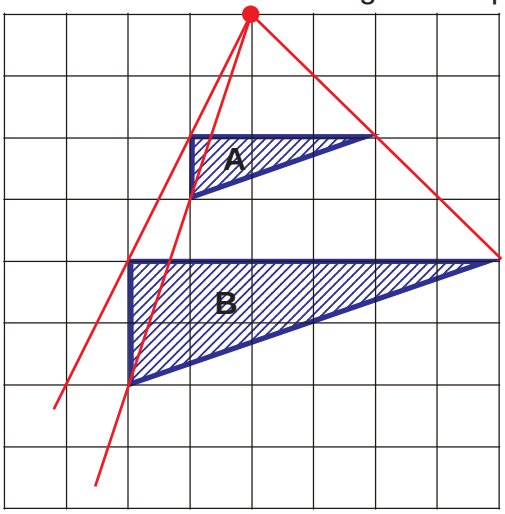


d) Scale factor 0.5

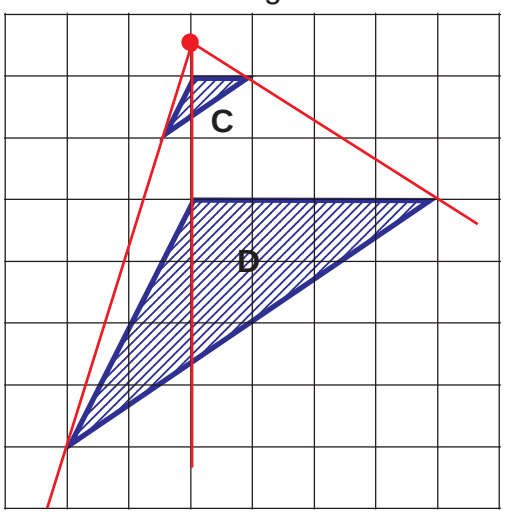


2) Use dots to mark on the grids the positions of the centres of enlargement.

a)



b)



G29 Bounds

Answers

1) The length of a bracelet is 24 cm measured to the nearest centimetre.

   a) Work out the lower bound of the length of the bracelet. 23.5 cm

   b) Work out the upper bound of the length of the bracelet. 24.5 cm

2) The length of a snake is 80 cm measured to the nearest 10 centimetres.

   a) Work out the lower bound of the length of the snake. 75 cm

   b) Work out the upper bound of the length of the snake. 85 cm

3) The weight of a necklace is 145 g measured to the nearest 5 grams.

   a) Work out the lower bound of the weight of the necklace. 142.5 g

   b) Work out the upper bound of the weight of the necklace. 147.5 g

4) The length of a line is given as 17.2 cm measured to the nearest tenth of a centimetre.

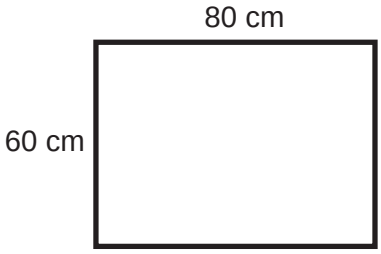
   a) Work out the lower bound of the length of the line. 17.15 cm

   b) Work out the upper bound of the length of the line. 17.25 cm

5) A rectangle has a length of 80 cm and a width of 60 cm, both measured to the nearest 10 cm.

   a) Work out the lower bound of the area of the rectangle. 4125 cm^2

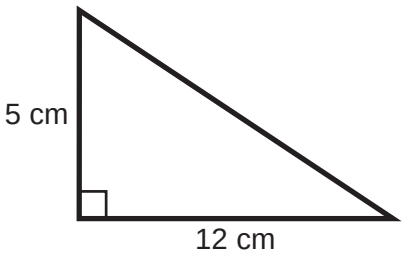
   b) Work out the upper bound of the perimeter of the rectangle. 300 cm



6) A right-angled triangle has lengths as shown, all measured to the nearest centimetre.

   a) Work out the lower bound of the area of the triangle. 25.875 cm^2

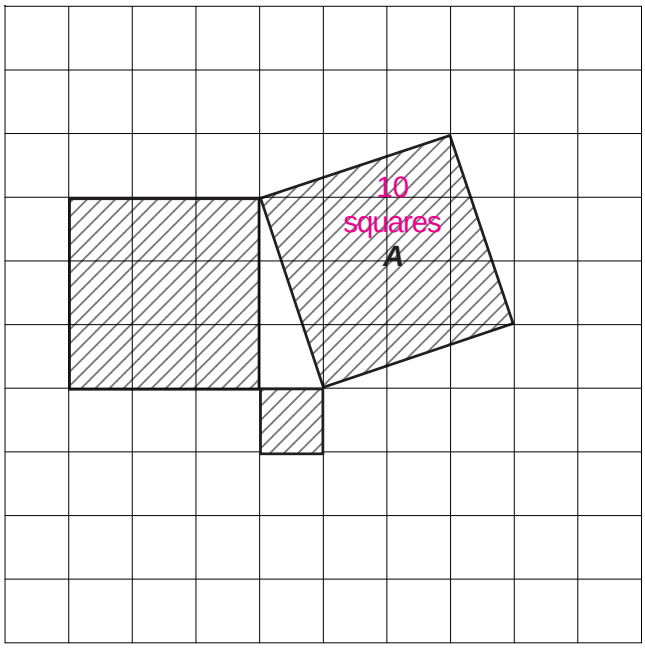
   b) Work out the upper bound of the area of the triangle. 34.375 cm^2

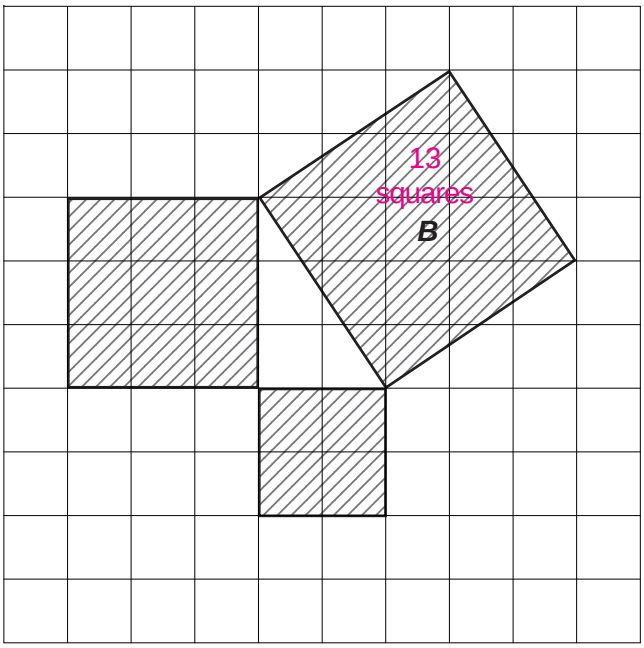


G30 Pythagoras

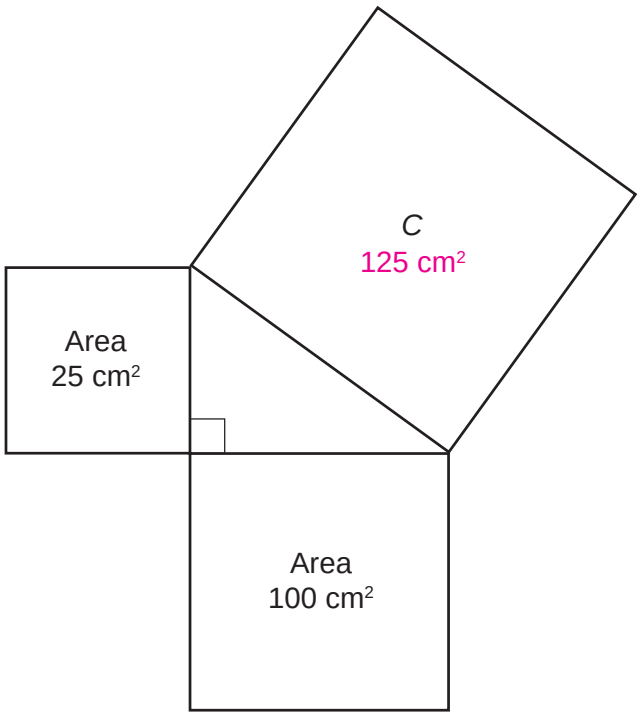
Answers

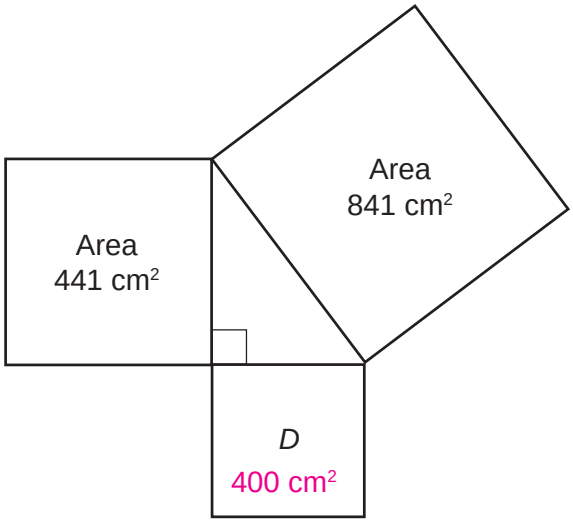
1) Use Pythagoras' theorem to work out the areas of squares *A* and *B*.





2) Use Pythagoras' theorem to work out the areas of squares *C* and *D*.





G30 Pythagoras

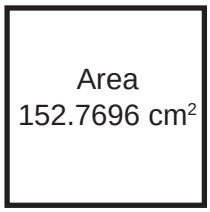
Answers

1) Find the lengths of the sides of these three squares.

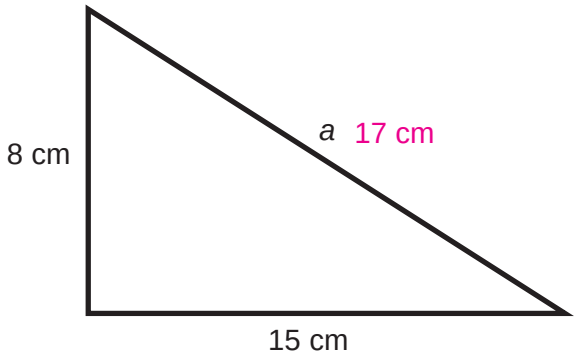
a) 23 cm

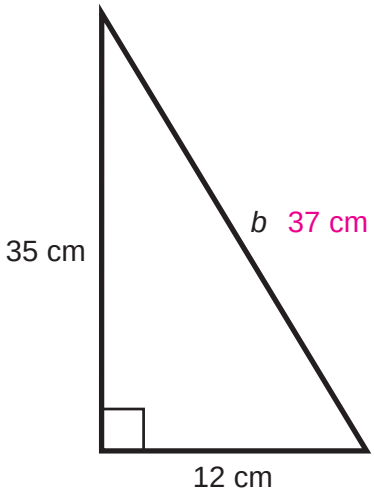
b) 14.5 cm

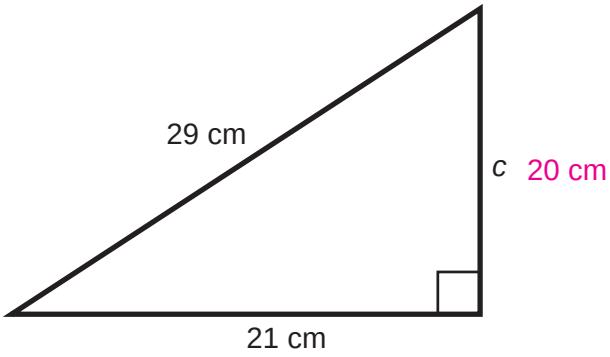
c) 12.36 cm

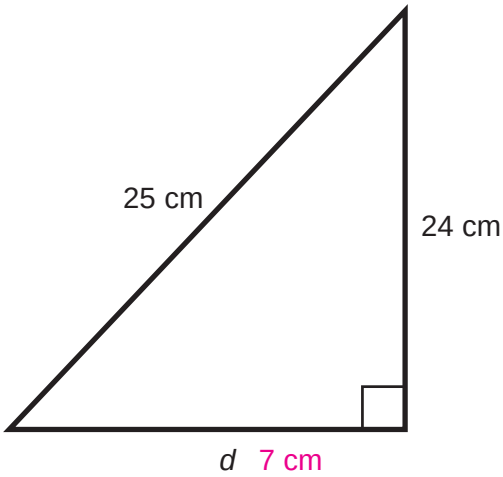


2) Find the lengths of the sides labelled *a* to *d*.





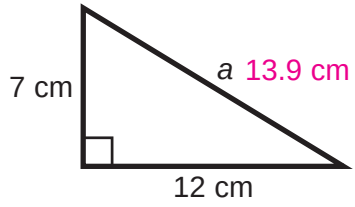


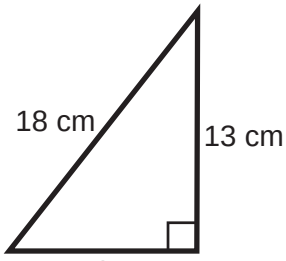


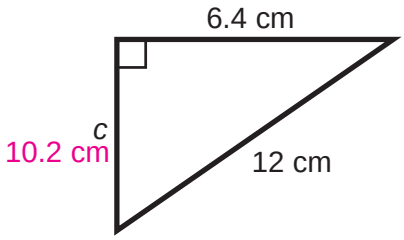
G30 Pythagoras

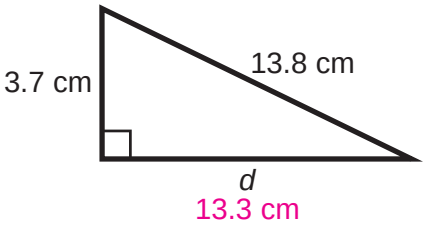
Answers

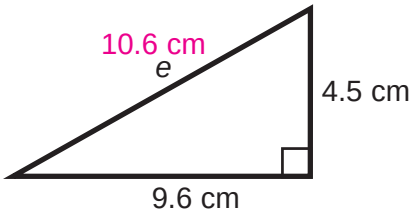
1) Calculate the lengths of the sides *a* to *f*, giving each answer to 1 decimal place.

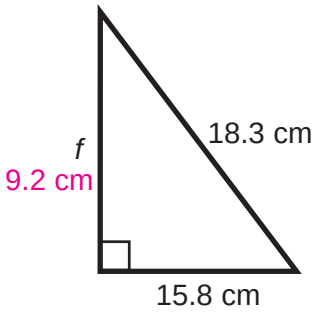




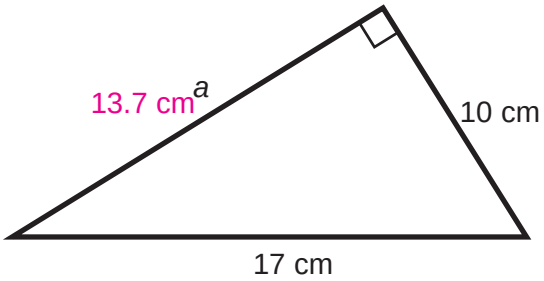


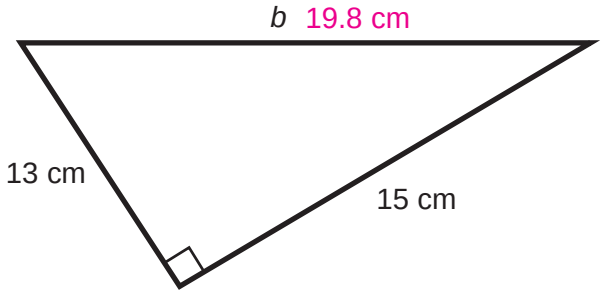






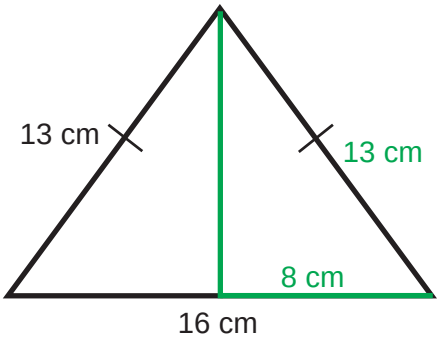
2) Calculate the lengths of the sides *a* and *b*, giving each answer to 1 decimal place.





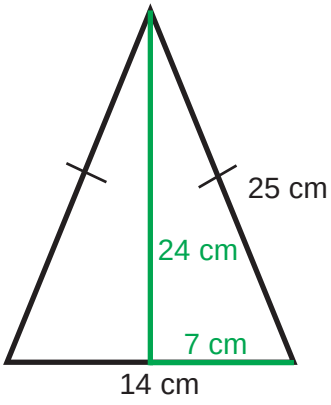
3) Find the height of this isosceles triangle.
Give your answer to 1 decimal place.

10.2 cm



4) Find the area of this isosceles triangle.

168 cm^2



P5 Two-Way Tables Probabilities *Answers*

1) The two-way table shows the favourite colours of boys and girls.

	Red	Blue	Green	Total
Boys	9	8	11	28
Girls	7	13	12	32
Total	16	21	23	60

a) Complete the two-way table.

b) What is the probability that a person chosen at random is a boy whose favourite colour is green? $\frac{11}{60}$

c) What is the probability that a person chosen at random is a girl whose favourite colour is red? $\frac{7}{60}$

d) What is the probability that a person chosen at random is a girl or has favourite colour blue or both? $\frac{40}{60}$

e) What is the probability that a person chosen at random is a boy or has favourite colour green or both? $\frac{40}{60}$

P6 Venn Diagrams

Answers

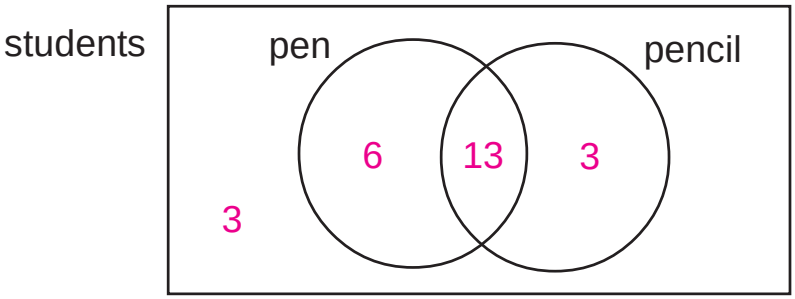
1) In a class of 25 students:

19 have a pen

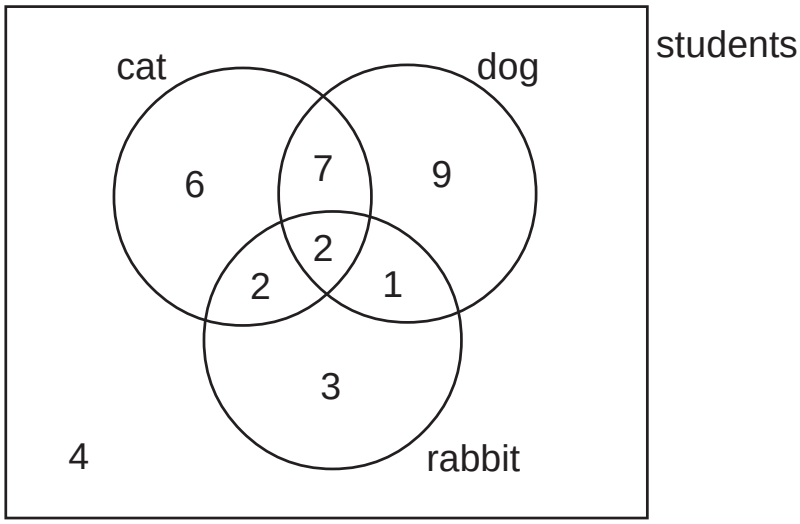
16 have a pencil

3 have neither

Put this information into the Venn diagram.



2) This Venn diagram represents the pets owned by a group of students.



a) How many students have a cat only? 6

b) How many students have a cat and a rabbit? 4

c) How many students have either a dog or a cat or both? 27

d) What is the probability that a student, chosen at random, has a dog only? $\frac{9}{34}$

e) What is the probability that a student, chosen at random, has a cat, a rabbit and a dog? $\frac{2}{34}$

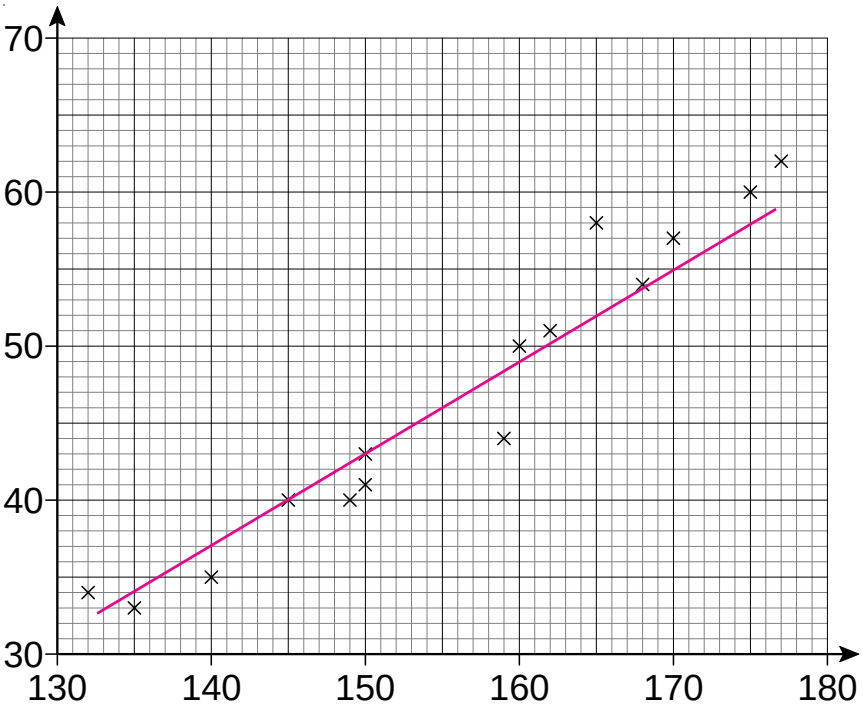
f) What is the probability that a student, chosen at random, has a dog or a rabbit or both? $\frac{24}{34}$

S8 Scatter Diagrams

Answers

1) The heights and weights of some children are shown in the table, below.

Height (cm)	132	145	150	140	175	168	177	162	170	162	165	149	150	135	159	160
Weight (kg)	34	40	43	35	60	54	62	51	57	51	58	40	41	33	44	50



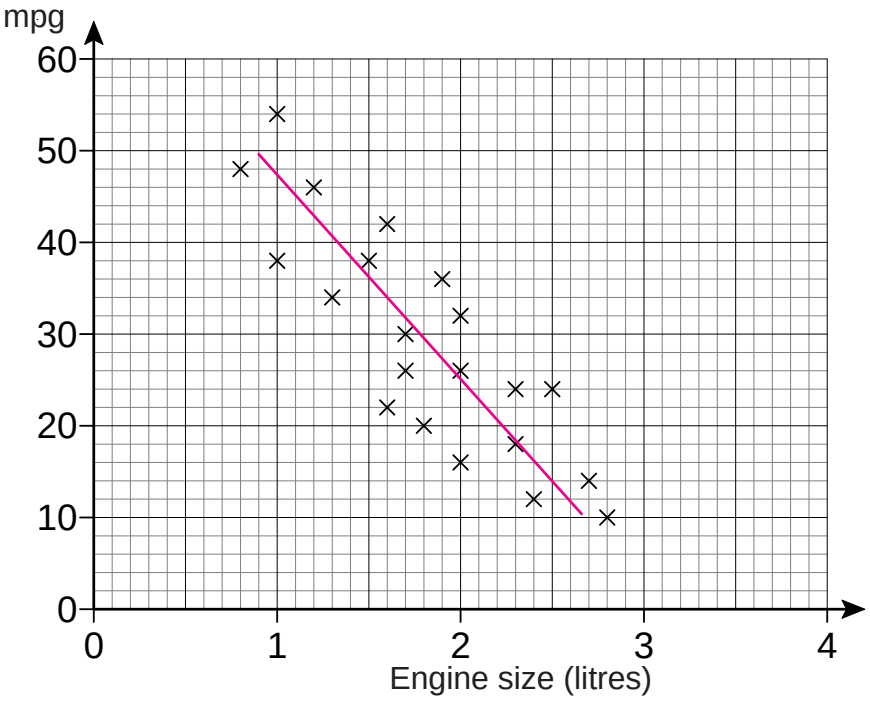
a) Plot the information from the table.

b) Describe the correlation between height and weight.
Positive correlation

c) Draw a line of best fit.

d) Estimate the weight of a child of similar age to the group above with a height of 155 cm. **46 kg**
Your answer will depend on your line of best fit.

2) The scatter graph below relates car engine sizes to their fuel consumption in mpg.



a) Describe the correlation shown by the data.
Negative correlation

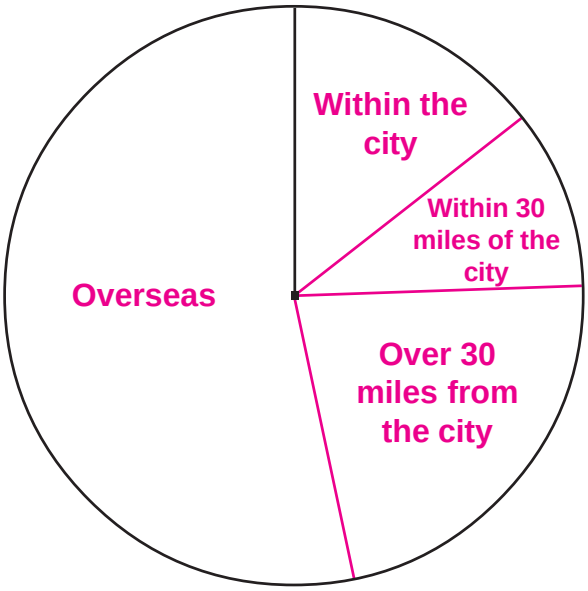
b) A car has an mpg of 25. Estimate the engine size.
2 litres

Your answer will depend on your line of best fit which you must have drawn.

S9 Pie Charts

Answers

1) The table on the right shows how far 90 visitors to a museum have travelled.
Draw a pie chart to show this information.



Distance	Frequency	
Within the city	13	× 4 = 52°
Within 30 miles of the city	9	× 4 = 36°
Over 30 miles from the city	20	× 4 = 80°
Overseas	48	× 4 = 192°
	90	

360° ÷ 90 = 4°

2) The table shows the land usage of a farm.
Draw a pie chart to show this information.

Land usage	Area (hectares)	
Arable	80	× 1.5 = 120°
Pasture	70	× 1.5 = 105°
Woodland	50	× 1.5 = 75°
Waste	40	× 1.5 = 60°
	240	

360° ÷ 240 = 1.5°