ENMATHS

Optimize Individual Potentials

# GCSE Higher MATHS Work booklet

# UNITS 3 - Homework 1H



## BIDMAS

Follow the correct order of operations to calculate the following:

1. 5 + 2 x 3 = ___
2. 10 ÷ 2 + 7 = ___
3. 7 + 9 ÷ 3 = ___
4. 2 x 3 + 7 x 2 = ___
5. 8 ÷ 4 – 2 x 1 = ___
6. 5 x 10 + 9 ÷ 1 = ___
7. 2 + 4 x 4 + 1 = ___
8. (2 + 4) x 8 = ___
9. (3 – 1) x (9 – 4) = ___
10. 30 – (7 + 6) = ___
11. 20 – (4 + 10) = ___
12. (5 + 9) ÷ (2 x 1) = ___

## BRACKETS

Put brackets into the questions to make them correct.

1. 2 + 2 x 3 = 12
2. 4 – 1 x 7 = 21
3. 2 + 1 x 1 + 2 = 9
4. 9 ÷ 3 x 2 + 1 = 9
5. 50 ÷ 7 + 3 = 10
6. 6 + 2 x 4 + 3 = 51

## 1234

Use the digits 1, 2, 3, and 4 to make correct calculations. Use brackets where appropriate.

1 = _____

2 = _____

3 = _____

4 = _____

5 = _____

6 = _____

7 = _____

8 = _____

9 = _____

10 = _____

## EXAM QUESTION

(a) Work out $12 - (3 + 7)$

(b) Put brackets in each of these calculations to make them correct.

(i) $18 - 4 - 2 = 16$

(ii) $3 + 4 \times 5 = 35$

(iii) $20 \div 5 - 3 = 10$

# UNITS 3 - Homework 2H



## PRIME NUMBERS

Answer TRUE or FALSE:

| | | | | | |
|---|---|---|---|---|---|
| 1. | 2 is a prime number | 2. | 9 is a prime number | 3. | 15 is a prime number |
| 4. | 7 is a prime number | 5. | 19 is a prime number | 6. | 23 is a prime number |
| 7. | 21 is a prime number | 8. | 8 is a prime number | 9. | 27 is a prime number |
| 10. | 3 is the smallest prime number | 11. | There are four prime numbers between 1 and 10 | | |
| 12. | 99 is a prime number | 13. | There are three primes between 20 and 30 | | |

## PRIME FACTORS

Write each number as a product of its' prime factors:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. | 21 | 2. | 12 | 3. | 36 | 4. | 50 |
| 5. | 150 | 6. | 54 | 7. | 49 | 8. | 84 |

## RECIPROCALS

Write down the reciprocal of each number

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. | 3 | 2. | 2 | 3. | 5 | 4. | $\frac{1}{4}$ |
| 5. | $\frac{1}{2}$ | 6. | 10 | 7. | $\frac{1}{8}$ | 8. | $\frac{1}{9}$ |
| 9. | 5 | 10. | $\frac{2}{3}$ | 11. | $\frac{3}{4}$ | 12. | 6 |

## EXAM QUESTIONS

1. $P$ is a prime number.
   $Q$ is an odd number.
   State whether each of the following is always odd or always even or could be either odd or even.
   (a) $P(Q+1)$ (b) $Q-P$

2. Write 75 as the product of its prime factors.

3. $a$ and $b$ are prime numbers.

   $ab^3 = 54$

   Find the values of $a$ and $b$.

# UNITS 3 - Homework 3H



## Multiples

Write down the first six multiples of each number:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1. | 4 | 2. | 3 | 3. | 7 | 4. | 9 |
| 5. | 15 | 6. | 12 | 7. | 8 | 8. | 11 |

## Highest Common Factor

Find the Lowest Common Factor (HCF) for each pair of numbers.

| | | | | | |
|---|---|---|---|---|---|
| 1. | 36 and 10 | 2. | 50 and 30 | 3. | 45 and 27 |
| 4. | 100 and 36 | 5. | 88 and 56 | 6. | 36 and 32 |

## Lowest Common Multiple

Find the Highest Common Multiple (LCM) for each pair of numbers.

| | | | | | |
|---|---|---|---|---|---|
| 1. | 6 and 9 | 2. | 5 and 15 | 3. | 12 and 8 |
| 4. | 2 and 11 | 5. | 12 and 8 | 6. | 5 and 9 |

## EXAM QUESTIONS

1. (a) Write down two multiples of 4.

Answer ..... and ..... *(1 mark)*

(b) Write down two multiples of 7.

Answer ..... and ..... *(1 mark)*

(c) Write down a number which is a multiple of both 4 and 7.

Answer ..... *(1 mark)*

2. Find the least common multiple (LCM) of 28 and 42.

3. What is the least common multiple (LCM) of 12 and 18?

4. Find the Highest Common Factor (HCF) of 54 and 135.

# UNITS 3 - Homework 4H



## ESTIMATING

Copy the lists below and match up the questions to the estimated answers. The first one has been done for you.

| QUESTIONS | ESTIMATED ANSWERS |
|---|---|
| 3.92 x 5.05 | 3 |
| 6.9 x 2.9 | 100 |
| 30.1 ÷ 9.91 | 11.4 |
| √32 | 15 |
| (8.8 + 11.11) x 4.9 | 40 |
| 50 ÷ 7.21 | 7 |
| √103 | 8 |
| 4.05 x (6.9 + 2.9) | 20 |
| 67 ÷ 8.12 | 12.2 |
| √150 | 5.5 |

## EXAM QUESTIONS

1. Find an approximate value of $\frac{2987}{21 \times 49}$

   You **must** show all your working.

2. Find an approximate value of $\frac{48.8 \times 5.22}{(10.13)^2}$

   You **must** show all your working.

3. Use approximations to estimate the value of $\frac{316 \times 4.03}{0.198}$

   You **must** show your working.

# UNITS 3 - Homework 5H



## SIGNIFICANT FIGURES

1. Write each number correct to one significant figure.

a) 27 b) 832 c) 8.12 d) 93 e) 77 f) 13.5 g) 95

2. Use a calculator to work out the answers and write them down correct to 1 significant figure.

a) 50 x 23 b) 5.25 x 7 c) 910 x 12 d) 9.5 x 7.3 e) 93 x 77

3. Write each number correct to two significant figures.

a) 275 b) 0.03451 c) 8.12 d) 0.956 e) 7.04 f) 7.05 g) 959

4. Write each number correct to three significant figures.

a) 27589 b) 0.03451 c) 8.1254 d) 0.95621 e) 0.0704124 f) 7.05555 g) 959595

## ESTIMATING CALCULATIONS

By approximating each number, estimate the answers to these calculations. You must show how you reached your estimate.

1. $\dfrac{4.9+15.21}{1.9}$

2. $\dfrac{19.89\times5.2}{1.05+9.03}$

3. $\sqrt{4.05\times4.9\times5.09}$

## EXAM QUESTIONS

1. Find an approximate value of $\dfrac{41 \times 197}{78}$

   You **must** show all your working.

2. Calculate the value of

$$\frac{8.4 - 3.79}{11.62 - 15.89}$$

   (a) Write down the full calculator display.

   (b) Give your answer to three significant figures.

3. Hannah, Gemma and Jo use their calculators to work out the value of

$$\frac{28.78}{4.31 \times 0.47}$$

   Hannah gets 142.07, Gemma gets 14.207 and Jo gets 3.138

   Use approximations to show which one of them is correct.
   You **must** show your working.

# UNITS 3 - Homework 6H



## ROUNDING IN CALCULATIONS

Give your final answer to each question correct to two decimal places.
Remember not to round during the intermediate steps of the calculation.

1. $\dfrac{6.2+3.09}{3.2\times 8.91}$

2. $\sqrt{\dfrac{4.9}{1.2\times 3.8}}$

3. $\dfrac{9}{2.17}+\dfrac{8.14}{0.515}$

4. $\dfrac{9.054-0.973}{6.3\times 0.00462}$

5. $\dfrac{7.56^3}{\sqrt{3.9\times 9.017}}$

6. $5+\sqrt{3.2^2-2.1\times 9.2\times 1.1}$

## HIGHEST AND LOWEST

1. The length of a pencil is given as 9cm to the nearest cm.
What is the minimum length that the pencil could be?

2. The height of a door is 210cm to the nearest 10cm.
What is the maximum height that the door could be?

3. The width of a piece of paper is given as 18.4cm correct to one decimal place.
a) What is the minimum width that the paper could be?
b) What is the maximum width that the paper could be?

## EXAM QUESTIONS

1. (i) Calculate $\dfrac{9.8}{6.7-1.2}$

Answer .....

(ii) Give your answer to an appropriate degree of accuracy.

Answer .....

2. The scales at an airport weigh luggage to the nearest kilogram.
What are the greatest and least possible weights of a case showing 25 kg on the scale?

.....

Answer Greatest ..... kg

Least ..... kg

3. Calculate the value of

$$\frac{8.4-3.79}{11.62-15.89}$$

(a) Write down the full calculator display.

(b) Give your answer to three significant figures.

# UNITS 3 - Homework 7H



UPPER AND LOWER BOUNDS
EXAM QUESTIONS

1. $a = 1.7$ measured to 2 significant figures.
$b = 3.0$ measured to 2 significant figures.
$c = 1.32$ measured to 3 significant figures.
Calculate the upper limit of $V$.

$$V = ab - c^2$$

2. A boy runs 50 metres at a speed of 5 m/s.
Both values are measured to an accuracy of one significant figure.
What is the least possible time taken?

3. A crane has a cable with a breaking strain of 5300 kg measured to 2 significant figures.
It is used to lift crates which weigh 100 kg measured to the nearest 10 kg.

What is the greatest number of crates that can be lifted at one time so that the cable does not break?

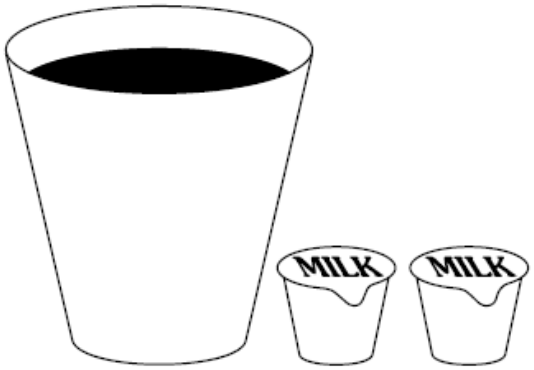
4. A coffee machine dispenses 130 millilitres of black coffee into cups with a capacity of 175 millilitres.
These values are accurate to 3 significant figures.

Milk is supplied in small cartons which contain 21 millilitres, accurate to the nearest millilitre.

Beryl likes milky coffee and always puts 2 cartons of milk in her coffee.

Will Beryl's cup ever overflow?

You **must** show all your working.




5. Tim fits television aerials in houses.
He buys 100 metres of television cable.
Each house needs 10 metres of television cable.

The length of cable which Tim buys is correct to the nearest metre.
The length of cable needed for each house is correct to the nearest half metre.

After working on nine houses, what is the minimum length of cable which Tim could have left?
You **must** show your working.

# UNITS 3 - Homework 8H



## MULTIPLICATION AND DIVISION (WHOLE NUMBERS)

| | | | | | |
|---|---|---|---|---|---|
| **1** | 14 x 8 | **2** | 24 x 3 | **3** | 31 x 5 |
| **4** | 62 x 9 | **5** | 39 x 7 | **6** | 66 x 4 |
| **7** | 26 x 15 | **8** | 26 x 16 | **9** | 63 x 22 |
| **10** | 21 ÷ 7 | **11** | 50 ÷ 5 | **12** | 30 ÷ 6 |
| **13** | 115 ÷ 5 | **14** | 128 ÷ 8 | **15** | 126 ÷ 6 |
| **16** | 234 ÷ 18 | **17** | 396 ÷ 18 | **18** | 285 ÷ 19 |

## MULTIPLYING DECIMALS

| | | | | | |
|---|---|---|---|---|---|
| **1** | 1.5 x 6 | **2** | 7.5 x 4 | **3** | 2.8 x 5 |
| **4** | 4 x 0.6 | **5** | 4.3 x 3.7 | **6** | 7.7 x 1.5 |

## DIVIDING WITH DECIMALS

| | | | | | |
|---|---|---|---|---|---|
| **1** | 2.7 ÷ 3 | **2** | 5.4 ÷ 6 | **3** | 3.5 ÷ 5 |
| **4** | 24 ÷ 0.8 | **5** | 54 ÷ 0.6 | **6** | 15 ÷ 0.5 |

## EXAM QUESTION

1. You are given that

$$77 \times 81 = 6237$$

(a) For each calculation below, insert a decimal point in the answer to make it correct.

(i) $77 \times 8.1 = 6\,2\,3\,7$ (ii) $7.7 \times 8.1 = 6\,2\,3\,7$

(b) Use the given calculation to work out $\frac{6237}{7.7}$

2. Use the calculation

$$294 \times 4.57 = 1343.58$$

to find the value of

(a) $294 \times 0.00457$

(b) $134\,358 \div 29.4$

# UNITS 3 - Homework 9H



## ADDING AND SUBTRACTING FRACTIONS

1. Fill in the boxes by adding the fractions.

| + | $\frac{1}{3}$ | $\frac{2}{5}$ | $\frac{3}{8}$ | $\frac{2}{7}$ |
|---|---|---|---|---|
| $\frac{1}{2}$ | | | | |
| $\frac{2}{3}$ | | | | |

2. Work out each question without a calculator. Show your working and write your answer in its' simplest form.

a) $\frac{1}{4}+\frac{3}{5}$ b) $\frac{3}{5}-\frac{1}{3}$ c) $\frac{1}{9}+\frac{1}{10}$ d) $\frac{3}{4}-\frac{1}{6}$

3. Work out each question with a calculator.

a) $\frac{3}{4}+\frac{3}{15}$ b) $\frac{7}{10}-\frac{2}{3}$ c) $\frac{7}{9}+\frac{7}{10}$ d) $\frac{13}{15}-\frac{9}{20}$

## EXAM QUESTIONS

1. Heather is revising fractions for her homework.
This is how she answers one of the questions.

$$\frac{1}{2} + \frac{1}{3} = \frac{2}{5}$$

Heather is wrong.
Show the correct way to work out $\frac{1}{2} + \frac{1}{3}$

2. Work out $\frac{1}{2} + \frac{1}{5}$

3. Tom has £2 200.
He gives $\frac{1}{4}$ to his son and $\frac{2}{5}$ to his daughter.
How much does Tom keep for himself?
You **must** show all your working.

4. Work out $\frac{3}{5} - \frac{1}{3}$

5. Calculate $\frac{5}{8} - \frac{1}{4}$

6. $\frac{3}{4} - \frac{1}{5}$

7. Work out the value of $\frac{2}{5} + \frac{1}{4}$

# UNITS 3 - Homework 10H



## MULTIPLYING FRACTIONS

Fill in the boxes by multiplying the fractions.

| × | $\frac{1}{3}$ | $\frac{2}{5}$ | $\frac{3}{8}$ | $\frac{2}{7}$ |
|---|---|---|---|---|
| $\frac{1}{2}$ | | | | |
| $\frac{2}{3}$ | | | | |

## MIXED NUMBERS

1. $1\frac{1}{2}+2\frac{3}{5}$

2. $3\frac{2}{5}-1\frac{1}{2}$

3. $2\frac{2}{3}\times3\frac{1}{4}$

## DIVIDING WITH FRACTIONS

1. $\frac{1}{2}\div\frac{1}{4}$

2. $\frac{2}{5}\div\frac{1}{10}$

3. $\frac{3}{4}\div\frac{3}{8}$

4. $\frac{3}{10}\div\frac{1}{5}$

5. $\frac{7}{9}\div\frac{3}{4}$

## EXAM QUESTIONS

1. Linda uses $\frac{3}{5}$ of a tin of paint to paint a fence panel.

   What is the **least** number of tins she needs to paint 8 fence panels?

2. On Monday Joe drinks $2\frac{1}{3}$ pints of milk.
   On Tuesday he drinks $1\frac{3}{4}$ pints of milk.
   Work out the total amount of milk that Joe drinks on Monday and Tuesday.

3. $\frac{2}{5}\times\frac{1}{4}$ $\frac{1}{3}\times\frac{4}{5}$

4. Work out $\frac{3}{7}\times28$

5. Work out $\frac{3}{5}\div6$

6. Fill in the boxes to make these statements correct.

   (i) $\frac{1}{5}\times\square=1$

   (ii) $\frac{3}{4}\times\frac{\square}{\square}=1$

7. Work out $4\frac{1}{3}-1\frac{2}{5}$

   Work out $2\frac{4}{5}+3\frac{2}{3}$

# UNITS 3 - Homework 11H



RECURRING DECIMALS
EXAM QUESTIONS

1. Which of these fractions can be written as recurring decimals?

$$\frac{1}{5} \qquad \frac{1}{6} \qquad \frac{5}{8} \qquad \frac{2}{3}$$

2. Express $\frac{2}{9}$ as a recurring decimal.

3. Express $0.\dot{4}\dot{8}$ as a fraction in its simplest form.

4. Write $0.3\dot{1}\dot{5}$ as a fraction in its simplest form.

5. (a) Prove that $0.\dot{5}\dot{8} = \frac{58}{99}$

   (b) Hence, or otherwise, express $0.1\dot{5}\dot{8}$ as a fraction.

6. Express the recurring decimal 0.4272727..... as a fraction.

   Give your answer in its simplest form.

7. Prove that the recurring decimal 1.207207207… is equal to the fraction $1\frac{23}{111}$

8. Prove that

$$0.3\dot{4}\dot{2} = \frac{113}{330}$$

9. (a) Express $0.\dot{5}\dot{1}$ as a fraction in its simplest form.

   (b) Express $0.45\dot{1}$ as a fraction in its simplest form.

10. (a) Write $0.\dot{4}$ as a fraction.

    (b) Express $0.6\dot{3}\dot{9}$ as a fraction.
    Give your answer in its simplest form.

# UNITS 3 - Homework 12H



POWERS AND ROOTS 'COLLECT A LETTER'

| START | 1000 | 8 | 32 | 49 | 64 |
|---|---|---|---|---|---|
| P | O | U | E | T | A |
| $2^3$ | $9^2$ | $5^2$ | $7^3$ | $6^3$ | $2^4$ |

| 27 | 121 | 36 | 100 | 1 | 125 |
|---|---|---|---|---|---|
| E | D | L | N | H | I |
| $4^3$ | $2^5$ | $5^3$ | $10^3$ | $6^2$ | $0^2$ |

| 216 | 16 | 343 | 0 | 25 | 81 |
|---|---|---|---|---|---|
| I | C | R | S | T | R |
| $10^2$ | $1^5$ | END | $7^2$ | $3^3$ | $11^2$ |

**1)** √25 $3^2$ √36 $2^3$ √100

**2)** √100 $4^2$ $2^2$ √81 √121

**3)** $5^2$ $4^2 + 2^2$ √144 √25+√36 $1^3 + 3^3$

**4)** √36 - √4 $4^2 - 2^2$ $1^3 + 2^3$ √100 - $3^2$ $1^3 + 1^2$

EXAM QUESTIONS

1. Write down the values of

   (a) $4^2$

   (b) $\sqrt{81}$

2. Work out the value of $10^5$

3. (a) Work out $3.7^2$

   (b) Work out the cube of 4

   (c) Work out $3 \div 0.7^2$

   (i) Write down the full calculator display.

   (ii) Give your answer to the nearest whole number.

4. (a) Calculate $2.7^2 + \sqrt{3.5}$

   (b) Calculate the cube of 4.2

# UNITS 3 - Homework 13H



## INDEX LAWS

1. Write each of these as simply as possible using indices.

a) 2x2x2x2x2 b) y x y x y x y c) 9x9x9 d) 8x8x8x8x8x8x8

2. Write down the value of the missing index.

a) $2^2 \times 2^3 = 2^x$ b) $3^8 \times 3^x = 2^{12}$ c) $5^2 \times 5^x = 5^9$ d) $2^x \times 2^3 = 2^7$

e) $(2^2)^4 = 2^x$ f) $(2^6)^x = 2^{18}$ g) $\frac{3^9}{3^2} = 3^x$ h) $\frac{4^8}{4^x} = 4^5$

3. State whether each equation is TRUE or FALSE.

a) $7^2 \times 7^6 = 7^8$ b) $\frac{8^3}{8} = 8^2$ c) $(5^4)^2 = 5^6$

## EXAM QUESTIONS

1. Simplify

$c \times c \times c \times c$

2. Simplify

(i) $x^5 \times x^{-2}$

(ii) $y^5 \div y^{-2}$

3. Simplify $(2xy^2)^3$

4. Simplify

(a) $w^6 \times w^2$

(b) $x^3 \div x^5$

(c) $(y^3)^2$

5. Simplify

$(2g^2h^4) \times (3g^3h)$

6. Simplify $(2x^4y)^3$

7. Simplify

$d^3 \times d^2$

8. Simplify

$\frac{e}{e^8}$

# UNITS 3 - Homework 14H



FRACTIONAL POWERS and NEGATIVE POWERS
EXAM QUESTIONS

1. (a) Write down the value of $11^0$

   (b) Find the value of $8^{\frac{2}{3}}$

   (c) Simplify $6^{-2} \times 144^{0.5}$

2. If $3^x = \frac{1}{27}$, find the value of $x$.

3. If $4^y = 64^{\frac{1}{2}}$, find the value of $y$.

4. (a) Find the value of $64^{\frac{1}{3}}$

   (b) Find the value of $8x^0$

5. Work out $64^{0.5} \times 3^{-2}$

   Give your answer as a fraction.

6. Work out $125^{\frac{1}{3}}$

7. Express $32^{-\frac{3}{5}}$ as a fraction.

8. Write $27^{-\frac{2}{3}}$ in the form $\frac{1}{n}$ where $n$ is an integer.

9. Calculate the value of $64^{-\frac{1}{2}}$, giving your answer as a fraction in its simplest form.

10. Write 32 in the form $4^b$

11. Evaluate $49^{0.5} \times 3^{-2}$

    Give your answer as a fraction.

12. Work out $27^{\frac{2}{3}}$

# UNITS 3 - Homework 15H



IRRATIONAL NUMBERS AND SURDS
EXAM QUESTIONS

1. Rationalise the denominator of $\dfrac{2+\sqrt{3}}{\sqrt{3}}$

Simplify your answer fully.

2. Find values of $a$ and $b$ such that

$$(2+\sqrt{3})(4-\sqrt{3}) = a + b\sqrt{3}$$

3. (a) You are given that $\sqrt{12}+\sqrt{27} = a\sqrt{3}$ where $a$ is an integer.

Find the value of $a$.

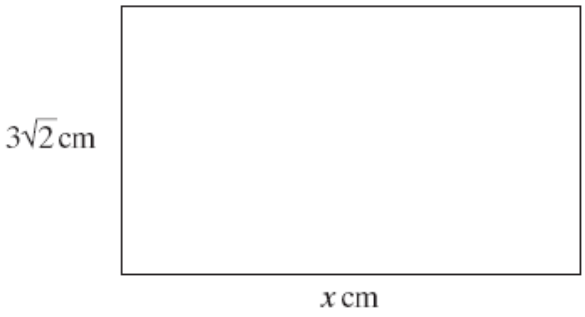
(b) Find the value of $(m+p)^2$ when $m=\sqrt{2}$ and $p=\sqrt{8}$

4. (i) Show that $\sqrt{20} = 2\sqrt{5}$

(ii) Expand and simplify $(\sqrt{2}+\sqrt{10})^2$

5. Expand and simplify $(3+\sqrt{7})^2$

6. The area of this rectangle is $30\,\text{cm}^2$.




Find the value of $x$, writing your answer in the form $a\sqrt{b}$ where $a$ and $b$ are integers.

7. (a) Find the value of $m$ when $\sqrt{75}-\dfrac{9}{\sqrt{3}} = m\sqrt{3}$

(b) Given that $r=\sqrt{6}$, $s=\sqrt{8}$, and $t=\sqrt{12}$

(i) Simplify fully, $\dfrac{t}{rs}$

(ii) Show that $\dfrac{r+t}{2+s} = \dfrac{\sqrt{6}}{2}$

# UNITS 3 - Homework 16H



STANDARD INDEX FORM
EXAM QUESTIONS

1. A builder has 7200 kg of sand.

   (a) Write 7200 kg in grams.
   Give your answer in standard form.

   (b) One grain of this sand weighs 0.0006 g.
   Write the weight of one grain of sand in standard form.

   (c) How many grains of sand are there in 7200 kg of sand?
   Give your answer in standard form.

2. Find the value of $(3.18 \times 10^5) \times (4.25 \times 10^3)$.
   Give your answer in standard form.

3. The star Alpha Centauri is approximately 40 653 230 000 000 kilometres from earth.
   Write this number in standard form to 3 significant figures.

4. Astronomers measure distances in the solar system in astronomical units (AU).
   One AU is 150 000 000 kilometres.
   The distance from the Sun to Pluto is 39.5 AU.
   How many kilometres is the Sun from Pluto?
   Give your answer in standard form to a sensible degree of accuracy.

5. (a) Write 7 billion as a number in standard form.

   1 billion = 1000 million

   (b) Write the number $4.5 \times 10^{-3}$ as an ordinary number.

   (c) Find the value of $(2.7 \times 10^3) \div (3.375 \times 10^5)$
   Give your answer in standard form.

6. Here are six numbers written in standard form.

   $2.6 \times 10^5$ $1.75 \times 10^6$ $5.84 \times 10^0$ $8.2 \times 10^{-3}$ $3.5 \times 10^{-1}$ $4.9 \times 10^{-2}$

   (a) Write down the largest number.

   (b) Write down the smallest number.

   (c) Write $4.9 \times 10^{-2}$ as an ordinary number.

   (d) Work out $2.6 \times 10^5 \div 0.1$
   Give your answer in standard form.

# UNITS 3 - Homework 17H



## PERCENTAGE INCREASE AND DECREASE

1. Increase £90 by 10%
2. Increase £110 by 50%
3. Increase £120 by 5%
4. Decrease £40 by 20%
5. Decrease £700 by 30%
6. Decrease £320 by 5%
7. Increase £620 by 25%
8. Decrease £180 by 60%

## EXAM QUESTIONS

1. Miss Evans earns £240 per week.
She is awarded a pay rise of 3.5%.
How much does she earn each week after the pay rise?

2. Mr and Mrs Smith are buying a washing machine.


How much do they pay for the washing machine?

3. During 2003 the number of people out of work in Barnsley fell by 8%.
At the end of the year there were 2576 people out of work in Barnsley.
How many people were out of work at the beginning of the year?

# UNITS 3 - Homework 18H



COMPOUND PERCENTAGE
EXAM QUESTIONS

1. £4500 is invested at 3.2% compound interest per annum.
How many years will it take for the investment to exceed £5000?

2. Annie invests £3000 for 5 years in a savings account that pays 4% compound interest per year.
How much will she have in the account at the end of 5 years?

3. An internet auction site has two identical cars for sale.
Both cars are priced at £10000.
The price of each car is to be reduced each week until they are sold.
The first car is reduced by 10% each week.
The second car is reduced by £800 each week.
Assuming that no-one buys the cars, after how many weeks will the second car be cheaper than the first?

You **must** show all your working.

4. A special savings account earns 10% per year compound interest.

Jill invests £2500 in the special account.
How much will she have in her account after 2 years?

5. Rob invested £2500 in a building society account at 2% per year compound interest.

Calculate the total amount in the account after three years.

6. Cobalt-60 is a radioactive substance that decays with time.
The mass of the cobalt reduces by 12% each year.

How many years will it take for 200 kg of cobalt-60 to decay to a mass of less than 120 kg?

7. In 2000, a motorway was used by 70000 vehicles each day.
Since 2000, the number of vehicles which used the motorway increased by 6% every year.

How many vehicles used the motorway each day in 2005?
Give your answer to an appropriate degree of accuracy.

# UNITS 3 - Homework 19H



REVERSE PERCENTAGE
EXAM QUESTIONS

1. Mr and Mrs Smith are buying a washing machine in a sale.


What was the original price of the washing machine?

2. A television has a sale price of £180.
This is a saving of 25% on the original price.
What was the original price?

3. A special savings account earns 10% per year

James invests in the special account.
After earning interest for one year, he has £1320 in his account.
How much money did James invest?

4. In Portugal, Brian spends €2.80 on ice cream.
This price includes VAT which is 12% in Portugal.

Find the amount of VAT which Brian paid.

5. Jane invested some money in a building society account.
Interest of 3% was added to the account after one year.
The total in the account after the interest was added was £221.45

How much money did Jane invest?

6. Gotland is an island which forms part of Sweden.
The area of Gotland is 3140 square kilometres.
This area is 0.8% of the total area of Sweden.

What is the total area of Sweden?

# UNITS 3 - Homework 20H



EXAM QUESTIONS

1. Bob and Mary win £250 on the Premium Bonds.
They share the money in the ratio 1 : 4

   (a) How much money does each person receive?

   (b) What percentage of the £250 does Mary receive?

2. The table shows the amounts needed to make 36 mince pies.

| Ingredient | Amount for 36 pies | Amount for 48 pies |
|---|---|---|
| Plain Flour | 330g | |
| Lard | 75g | |
| Butter | 75g | |
| Mincemeat | 720g | |

Calculate the amounts needed to make 48 mince pies.
Put your answers in the table.

3. The town of Axon has 35 600 houses.
The ratio of detached houses to other types of houses is 1 : 4
How many detached houses are there?

4. A short necklace has 32 gold beads and 8 black beads.
A long necklace has a total of 60 beads.
Both necklaces have the same ratio of gold beads to black beads.

How many black beads are on the long necklace?

5. In a school, there are 750 pupils in total in years 9, 10 and 11.
The numbers of pupils in years 9, 10 and 11 are in the ratio 12:7:6

How many pupils are there in each year?

6. Craig and Sophie share 60 chocolates.
They divide them in the ratio 2:3 with Sophie having the larger share.

How many chocolates does Sophie have?

# UNITS 3 - Homework 21H



## DIRECT PROPORTION
## EXAM QUESTIONS

1. $y$ is directly proportional to the square of $x$.
When $y = 5, x = 4$.
Find the value of $y$ when $x = 8$.

2. $W$ and $P$ are both positive quantities.
$W$ is directly proportional to the square root of $P$.
When $W = 12, P = 16$.

(a) Express $W$ in terms of $P$.

(b) What is the value of $W$ when $P = 25$?

(c) What is the value of $P$ when $W = 21$?

3. In an experiment measurements of $t$ and $h$ were taken.

These are the results.

| $t$ | 2 | 5 | 6 |
|---|---|---|---|
| $h$ | 10 | 62.5 | 90 |

Which of these rules fits the results?

(A) $h \propto t$ (B) $h \propto t^2$ (C) $h \propto t^3$

You **must** show all your working.

## INVERSE PROPORTION
## EXAM QUESTIONS

1. $y$ is inversely proportional to the square of $x$.
When $y = 3, x = 2$
Find the value of $y$ when $x = 4$

2. $M$ and $G$ are positive quantities.
$M$ is inversely proportional to $G$.
When $M = 90$, $G = 40$.

Find the value of $M$ when $G = M$.

# UNITS 3 - Homework 22H



EXAM QUESTIONS

1. Simplify the following

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

   (b) $5x + 3y - 2x + 4y$

2. Simplify $2x + 3y + 5x - 2y - 4x$

3. Expand and simplify $4(m + 3) + 3(2m - 5)$

4. Expand and simplify

   $5(2a - c) + 4(3a + 2c)$

5. Expand and simplify $4(2x - 1) + 3(x + 6)$

6. (a) Factorise $2x + 6$

   (b) Expand $3(4y + 1)$

7. Factorise completely $2a^2 - a$

8. (i) Multiply out $s(s^2 + 6)$

   (ii) Multiply out and simplify

   $4(x - 2) + 3(x + 2)$

9. Factorise completely the following expressions

   (i) $2a^2 + a$

   (ii) $8x^3y^2 - 4xy^3$

10. Expand $x^2(4 - 2x)$

11. Expand and simplify

    $5(2a - c) + 4(3a + 2c)$

12. Simplify the following

    $3 \times a \times 4$

13. Factorise completely $12y^2 - 8y$

14. Factorise $4c + 12$

15. Factorise fully $2x^2 - 50y^2$

# UNITS 3 - Homework 23H



## EXPANDING QUADRATIC EXPRESSIONS

### EXAM QUESTIONS

1. Expand and simplify

$$(x + 4)^2$$

2. Multiply out and simplify $(n + 3)^2$

3. (a) $(x - 3)^2 \equiv x^2 + px + 9$ is an identity.

What is the value of $p$?

(b) $(x - 3)^2 = 9$ is an equation.

Explain why $x = 0$ is a solution of this equation.

## FACTORISING QUADRATIC EXPRESSIONS

### EXAM QUESTIONS

1. Factorise $x^2 + 6x - 16$

2. Factorise $x^2 - 10x + 25$

3. Factorise $x^2 - 7x - 8$

4. Factorise $x^2 - 13x + 36$

# UNITS 3 - Homework 24H



## EXPANDING HARDER QUADRATIC EXPRESSIONS
## EXAM QUESTIONS

1. Expand and simplify $(4x - 3)(x + 5)$

2. Prove that $(n + 5)^2 - (n + 3)^2 = 4(n + 4)$

3. a) Expand and simplify $(2n + 1)^2$

   b) Prove that the square of any odd number is always 1 more than a multiple of 8.

4. Expand and simplify $(x - 3)(2x + 1)$

5. (a) Expand and simplify $(x + y)(x - y)$

   (b) Using your answer to part (a), or otherwise, find the exact value of

$$780^2 - 220^2$$

## FACTORISING HARDER QUADRATIC EXPRESSIONS
## EXAM QUESTIONS

1. Simplify fully

$$\frac{2x^2 + 5x - 3}{x^2 + 2x - 3}$$

2. (a) Factorise $2n^2 + 5n + 3$

   (b) Hence, or otherwise, write 253 as the product of two prime factors.

3. Simplify $\dfrac{x^2 - 9}{x^2 + 3x}$

4. Simplify fully $\dfrac{x^2 - 16}{3x^2 + 10x - 8}$

# UNITS 3 - Homework 25H

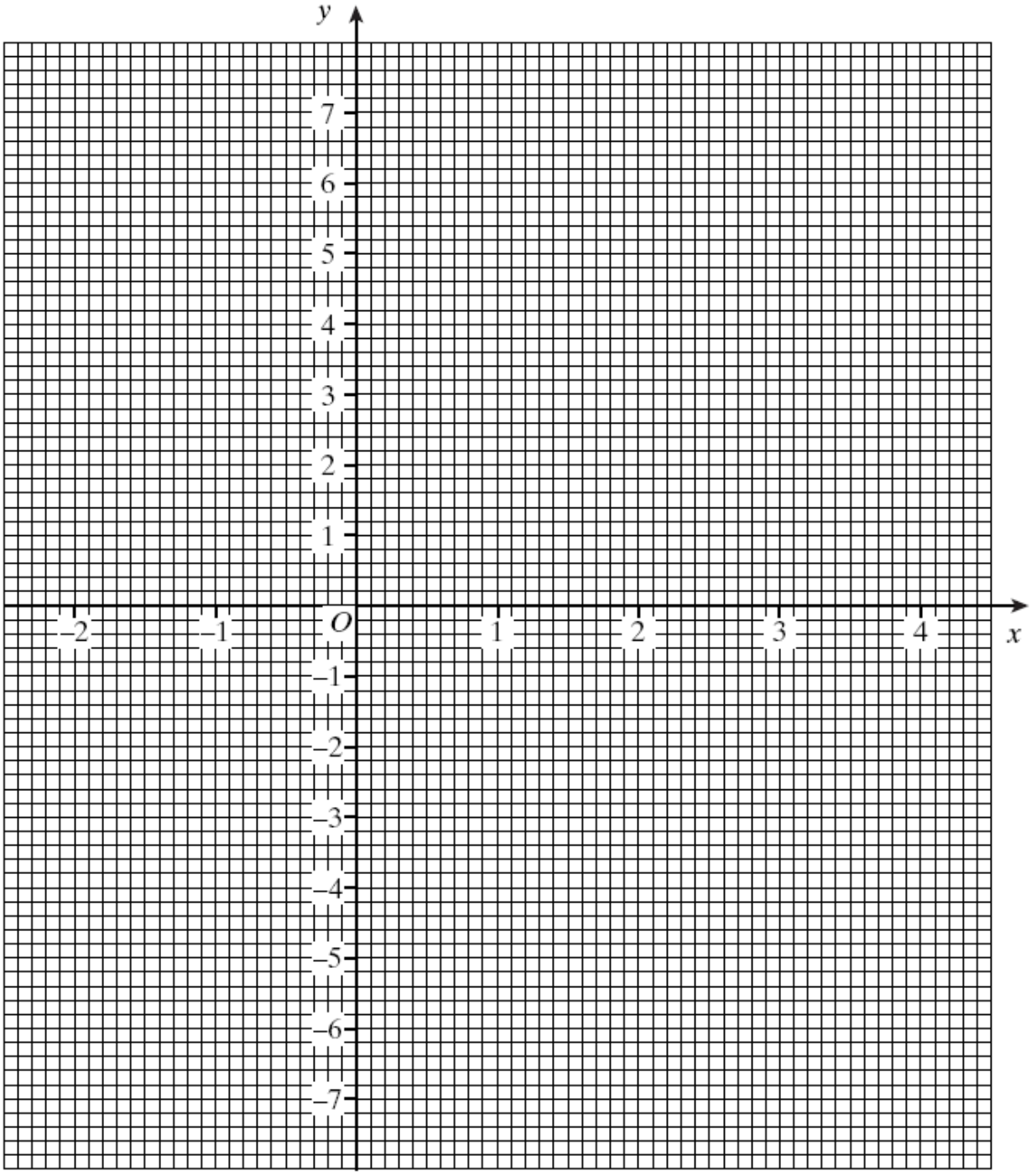


EXAM QUESTION

Complete this table of values for $y = (2 + x)(3 - x)$

| $x$ | –2 | –1 | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|
| $y$ | | 4 | 6 | 6 | 4 | 0 | |

On the grid, draw the graph of $y = (2 + x)(3 - x)$ for values of $x$ from –2 to +4.



# UNITS 3 - Homework 26H

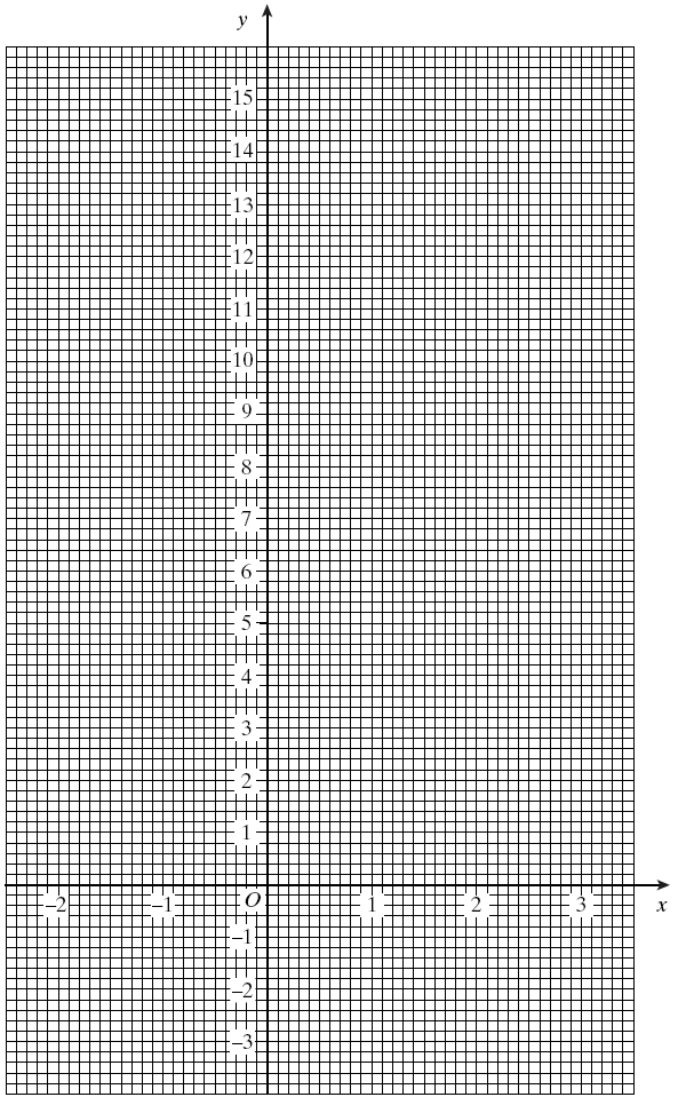


GRAPHICAL SOLUTION OF EQUATIONS 1
EXAM QUESTION

1. (a) Complete the table of values for $y = 2x^2 - 4x - 1$

| $x$ | –2 | –1 | 0 | 1 | 2 | 3 |
|---|---|---|---|---|---|---|
| $y$ | 15 | | –1 | | –1 | 5 |

(b) On the grid below draw the graph of $y = 2x^2 - 4x - 1$ for values of $x$ from – 2 to +3.




(c) An approximate solution of the equation $2x^2 - 4x - 1 = 0$ is $x = 2.2$

(i) Explain how you can find this from the graph.

(ii) Use your graph to write down another solution of this equation.

Answer $x$ = .....

# UNITS 3 - Homework 27H



GRAPHICAL SOLUTION OF EQUATIONS 2
EXAM QUESTIONS

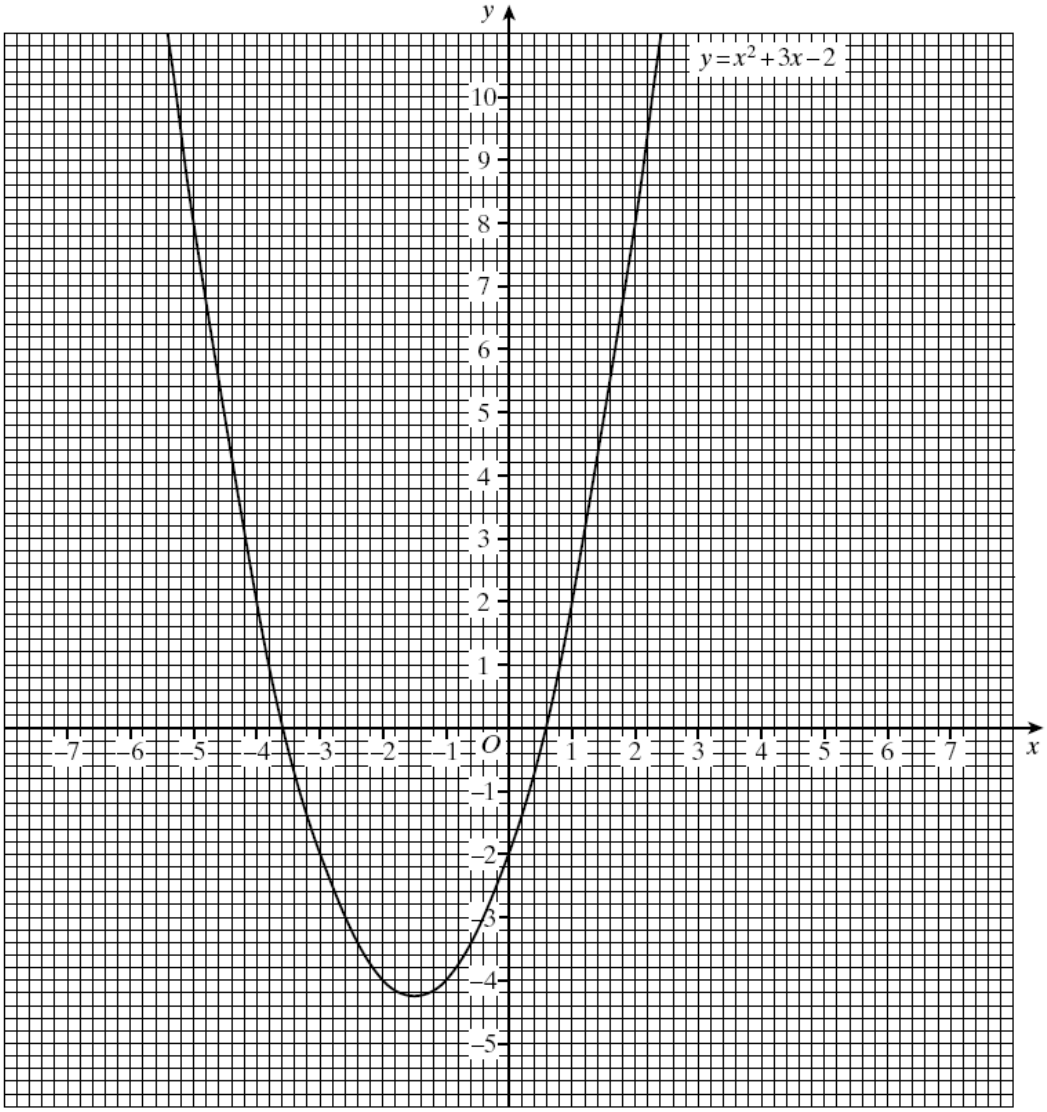
1. The grid below shows the graph of $y = x^2 + 3x - 2$

(a) By drawing an appropriate straight line on the graph solve the equation

$$x^2 + 3x - 3 = 0$$

(b) By drawing an appropriate straight line on the graph solve the equation

$$x^2 + 2x - 1 = 0$$




2. Find the quadratic equation whose solutions are the $x$-coordinates of the points of intersection of $y = x^2 - x - 6$ and $y = x + 2$.

3. The graph of $y = x^2 - 4x + 8$ is to be used to solve the equation $x^2 - 5x + 4 = 0$
What straight line graph would need to be drawn?

# HIGHER
# KEY STAGE 4

# GCSE

# HOMEWORKS

# UNITS 1 - Homework 1H



## DATA COLLECTION SHEETS AND QUESTIONNAIRES

### Exam questions

1. Michelle wants to find out if students buy lunch in the college restaurant, bring a packed lunch or go out of college for lunch.

   (a) (i) Design an observation sheet for Michelle to record the data.

   (ii) Complete your observation sheet by inventing data for 20 students.

   (b) Michelle decides to stand outside the college restaurant at 12 noon to collect her data.

   Give a reason why this is **not** a suitable place to carry out this survey.

2. Emma reads in a magazine that there is a link between the number of children and the number of pets in a family.

   (a) Design a two-way table to record the number of pets and the number of children in a sample of families.

   (b) Complete your two-way table by inventing data for eight families.

3. The manager of a cinema wants to find out how often teenagers attend the cinema.

   He uses a questionnaire.

   (a) Here is one part of the questionnaire.

   **Question** How often do you attend the cinema?

   **Response**

   ☐ Sometimes ☐ Occasionally ☐ Regularly

   Write down two criticisms of his response section.

   (b) Explain how the manager could distribute 50 questionnaires randomly to pupils from a school of 1000 pupils.

4. As each customer left the shop the manager gave them a questionnaire containing the following question.

   Question: How much money did you spend in the shop today?

   Response: Less than £10 ☐ Less than £20 ☐ Less than £30 ☐ £30 or more ☐

   Write down one reason why the response section of this question is not suitable.

# UNITS 1 - Homework 2H



## STRATIFIED SAMPLING

### Exam questions

1. 500 pupils in a boarding school are divided into 3 houses.
The number of pupils in each house is shown in the table.

| **House** | Kingfisher | Magpie | Blackbird |
|---|---|---|---|
| **Number of pupils** | 170 | 120 | 210 |

The headteacher wants to form a council of representatives from each house.

(a) The headteacher decides to take a sample of 25 pupils, stratified by house.
Calculate the number of pupils chosen from each house.
Show your working.

(b) Explain how the headteacher could choose the pupils from Magpie House.

2. A college wants to obtain a sample of its student population.
The college decides to take a stratified sample of size 200 by ethnic group.

The table shows the student population by ethnic group.

| **Ethnic group** | **Student population** |
|---|---|
| White | 725 |
| Black | 388 |
| Asian | 186 |
| Other | 151 |

(a) Show that the college should choose 26 Asian students as part of its sample.

(b) Calculate the number of students that the college should choose from each of the ethnic groups.

3. The table shows the numbers of each type of employee at a large store.

| **Management** | **Shop assistants** | **Office staff** | **Warehouse staff** | **Security staff** |
|---|---|---|---|---|
| 12 | 67 | 35 | 31 | 15 |

The owner wishes to choose some employees to form a committee to represent the views of all the employees.

(a) State **one** advantage of using a sample stratified by type of employee.

(b) The owner wants 16 employees on the committee. He decides to use a sample stratified by type of employee.

Complete the table to show how many of each type of employee he should choose.

| **Management** | **Shop assistants** | **Office staff** | **Warehouse staff** | **Security staff** |
|---|---|---|---|---|
| | | | | |

# UNITS 1 - Homework 3H



## STEM AND LEAF DIAGRAMS

### Exam questions

1. The stem and leaf diagram shows the number of miles travelled by a salesman each day for 14 days.

Key 5 | 2 represents 52 miles

| | |
|---|---|
| 1 | 2 3 |
| 2 | 3 6 |
| 3 | 5 7 7 8 |
| 4 | 1 3 4 8 |
| 5 | 2 5 |

On how many days did the salesman travel between 25 and 50 miles?

2. The number of cars passing through a set of traffic lights each time they are on green is recorded.

12 15 23 20 18 16 27 9 10

19 22 26 14 11 8 4 12 23

(a) Complete the stem and leaf diagram, including the key, to represent the data.

Key | ..... | ..... represents .....

| | |
|---|---|
| 0 | ..... |
| 1 | ..... |
| 2 | ..... |

3. A number of people were asked how many driving lessons they had taken.

The results are shown in the stem and leaf diagram.

Key: | 4 | 1 represents 41 lessons

| | |
|---|---|
| 0 | 8 |
| 1 | 2 4 4 7 8 |
| 2 | 0 1 2 4 4 5 9 |
| 3 | 2 5 8 |
| 4 | 1 |

(a) How many people were asked?

(b) What was the median number of driving lessons?

(c) Work out the range of the number of driving lessons.

# UNITS 1 - Homework 4H



## FREQUENCY DIAGRAMS Exam questions

1. A manager recorded how long each customer spent in his shop.
The table shows his results.

| Time, $t$ (minutes) | Frequency |
|---|---|
| $0 < t \leqslant 10$ | 4 |
| $10 < t \leqslant 20$ | 22 |
| $20 < t \leqslant 30$ | 18 |
| $30 < t \leqslant 40$ | 12 |

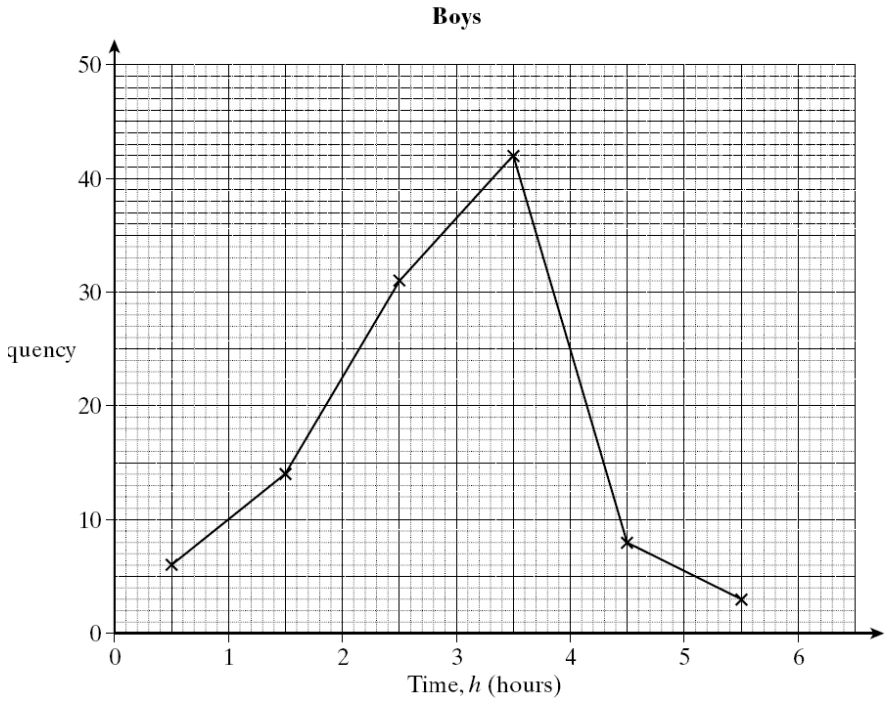
(a) Draw a frequency diagram to represent this data.

2. The Year 9 girls in a school were asked how long they spent using a computer one day.
The results are shown in the table.

| Time, $h$ (hours) | Number of girls |
|---|---|
| $0 \leqslant h < 1$ | 30 |
| $1 \leqslant h < 2$ | 46 |
| $2 \leqslant h < 3$ | 14 |
| $3 \leqslant h < 4$ | 5 |

(a) Draw a frequency polygon for this data.

(b) The frequency polygon below shows the number of hours spent using a computer by the Year 9 boys on the same day.




Write down **two** comparisons between the time spent using a computer by the boys and the girls.

## CUMULATIVE FREQUENCY
### Exam questions

1. A group of 80 trainee secretaries have their typing speeds tested.
The table shows their results in words per minute (wpm).

| Speed, $s$ (wpm) | Number of typists |
|---|---|
| $20 \leqslant s < 30$ | 8 |
| $30 \leqslant s < 40$ | 30 |
| $40 \leqslant s < 50$ | 24 |
| $50 \leqslant s < 60$ | 13 |
| $60 \leqslant s < 70$ | 5 |

| Speed, $s$ (wpm) | Cumulative frequency |
|---|---|
| $< 30$ | |
| $< 40$ | |
| $< 50$ | |
| $< 60$ | |
| $< 70$ | |

(a) (i) Complete the cumulative frequency column in the table.

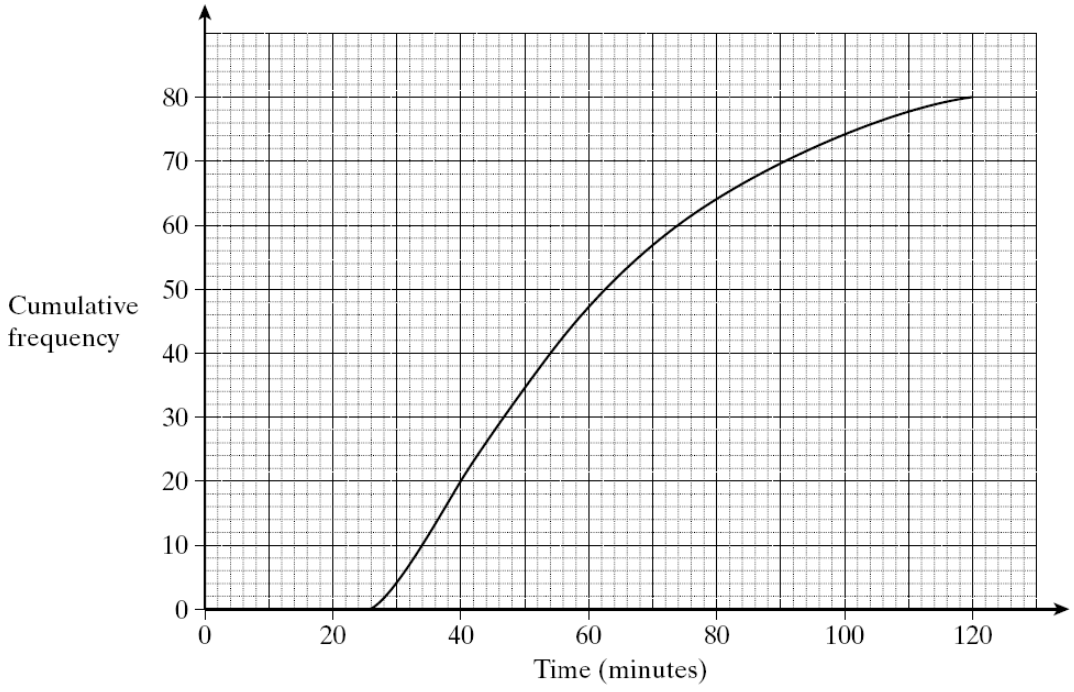
(ii) Draw a cumulative frequency diagram

(b) Use your diagram to estimate the interquartile range.

(c) Typists achieving less than 45 words per minute have to resit the test.

Estimate the number of typists who have to resit the test.

2. The journey times of 80 commuters are shown on the cumulative frequency diagram below.




Use the diagram to estimate

(a) the median journey time of these commuters,

(b) the interquartile range of the journey times of these commuters.

# UNITS 1 - Homework 6H



## BOX PLOTS

### Exam questions

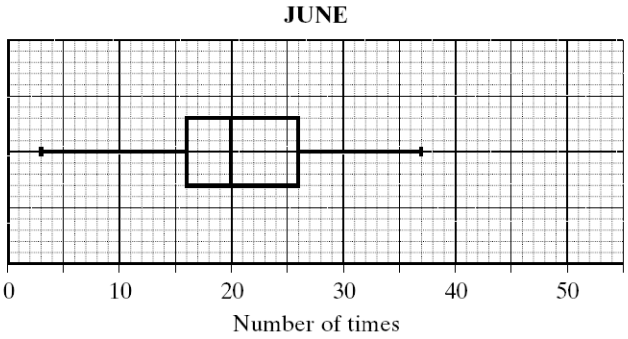
1. The manager of a gym recorded the number of times that sun-beds were used each day in January.

The table shows a summary of his results.

| | Number of times |
|---|---|
| Minimum | 16 |
| Lower quartile | 23 |
| Median | 28 |
| Upper quartile | 33 |
| Maximum | 40 |

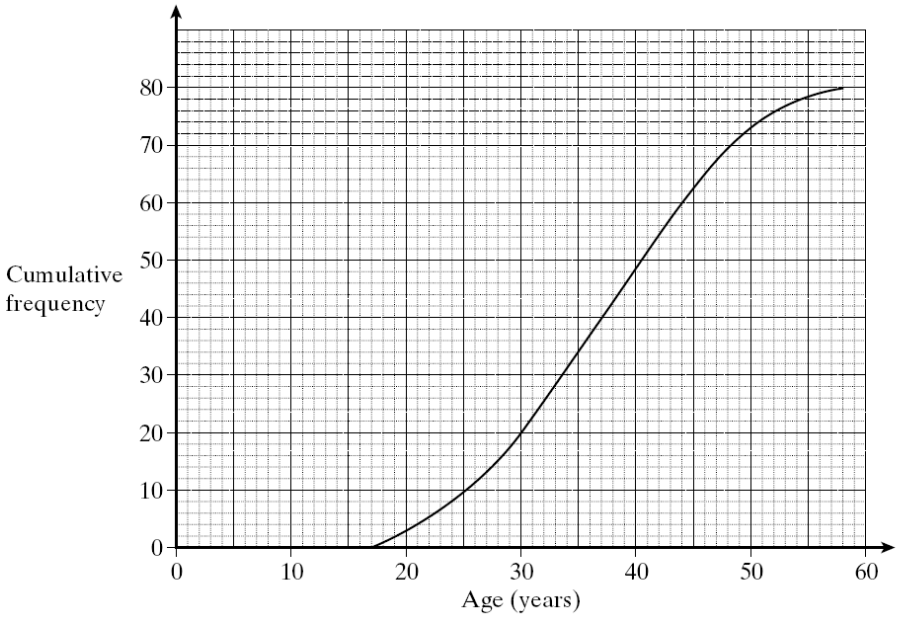
(a) Draw a box plot to show these results.

(b) The number of times that the sun-beds were used each day in June is summarized in the box plot below.




Write down **two** differences between the box plots.

2. The ages of 80 workers in a factory are represented by the cumulative frequency diagram. The youngest worker is 17 and the oldest is 57.




(a) Those workers who were aged 50 or over were offered early retirement. Use the cumulative frequency diagram to estimate how many workers were offered early retirement.

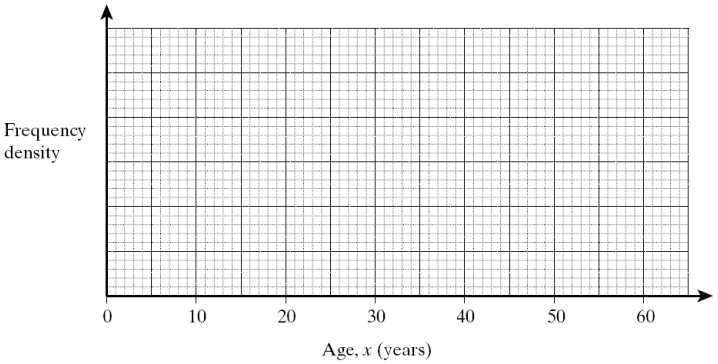
(b) Use the information in the diagram to draw a box plot

# UNITS 1 - Homework 7H

## HISTOGRAMS
## Exam questions

1. The table shows the age, in years, of workers in a factory.

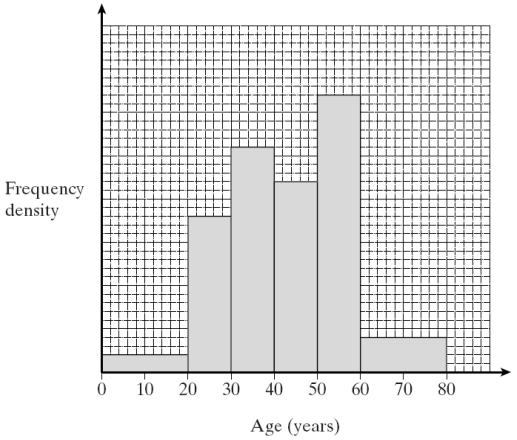
| Age, $x$ (years) | Number of workers |
|---|---|
| $15 \leqslant x < 20$ | 4 |
| $20 \leqslant x < 25$ | 10 |
| $25 \leqslant x < 30$ | 6 |
| $30 \leqslant x < 40$ | 22 |
| $40 \leqslant x < 60$ | 8 |




Draw a histogram to represent these ages.

Calculate an estimate of the number of workers who are aged under 21.

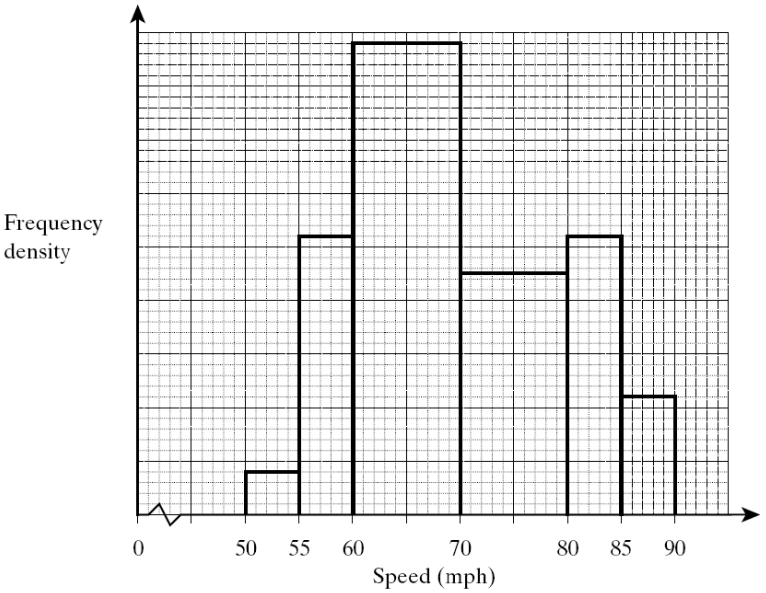
2. The histogram represents the ages of the members of a golf club.




There are 44 members who are aged under 30.

Calculate the number of members who are aged 55 or over.

3. The police carried out speed-checks on a large sample of cars on the M1 motorway.
The histogram shows the results.




There were 90 cars travelling between 50 and 60 mph.

Use the histogram to calculate how many cars were travelling between 70 and 90 mph.

# UNITS 1 - Homework 8H



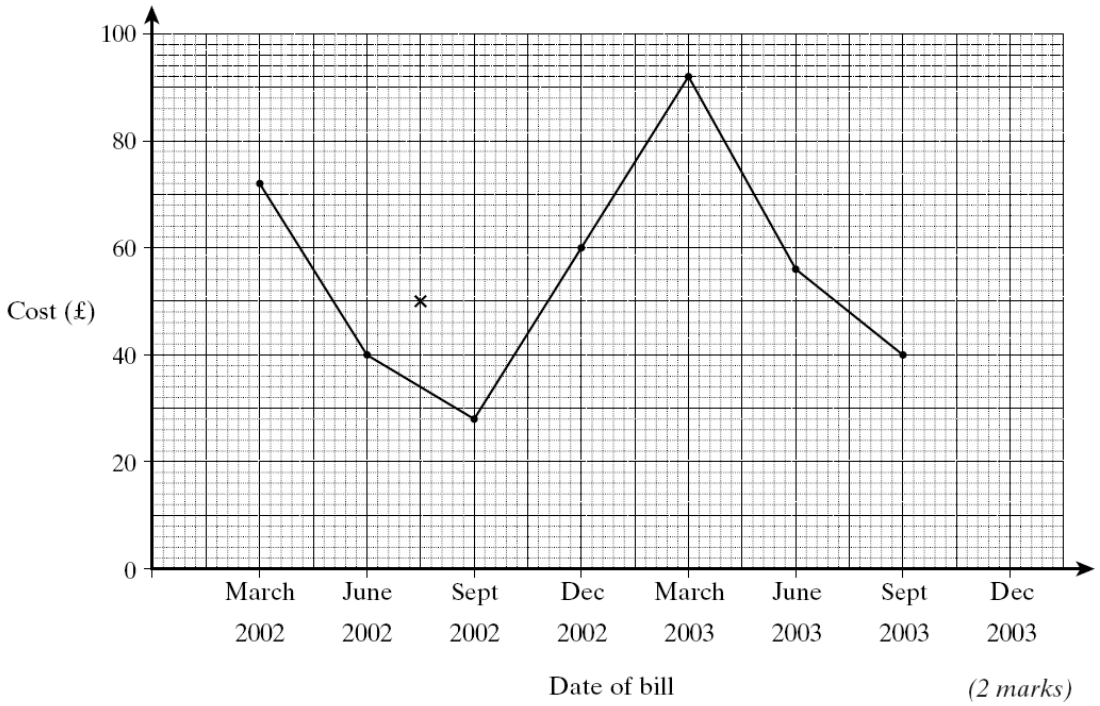
## TIME SERIES Exam questions

1. The table shows the costs of the heating bills for a house.

| Date of bill | March 2002 | June 2002 | Sept 2002 | Dec 2002 | March 2003 | June 2003 | Sept 2003 |
|---|---|---|---|---|---|---|---|
| Cost (£) | 72 | 40 | 28 | 60 | 92 | 56 | 40 |
| Four-point moving average (£) | 50 | | | | | | |

(a) You are given that the first four-point moving average is £50.
Calculate **all** the other four-point moving averages.

(b) The time series graph shows the original data.
The first four-point moving average, £50, has also been plotted.
Copy the graph and plot **all** the other moving averages.




*(2 marks)*

(c) Draw a trend line and use it to estimate the cost of the December 2003 heating bill.
You **must** show your working.

2. The table shows the amounts of Jenny's gas bills from September 2001 to December 2002.

| Date | September 2001 | December 2001 | March 2002 | June 2002 | September 2002 | December 2002 |
|---|---|---|---|---|---|---|
| Amount of bill (£) | 28.70 | 32.40 | 29.10 | 7.80 | 30.30 | 38.60 |

(a) Explain why a **four-point** moving average is appropriate for these data.

(b) Show that the first value of the four-point moving average is £24.50

(c) Calculate the second value of the four-point moving average for these data.

# UNITS 1 - Homework 9H



## AVERAGES FROM TABLES

### Exam questions

1. Chloe records the number of goals scored by her favourite football team in each of 40 matches.

| Number of goals | Frequency |
|---|---|
| 0 | 7 |
| 1 | 15 |
| 2 | 13 |
| 3 | 2 |
| 4 | 2 |
| 5 | 1 |

Calculate the mean number of goals scored per match.

2. A telephone company collected data about the number of telephones in each of 60 households.
The table shows the results.

| Number of telephones | Number of households |
|---|---|
| 0 | 2 |
| 1 | 15 |
| 2 | 12 |
| 3 | 10 |
| 4 | 8 |
| 5 | 7 |
| 6 | 5 |
| 7 | 0 |
| 8 | 1 |

(a) Calculate the total number of telephones in these 60 households.

(b) Calculate the mean number of telephones per household.

3. The table shows the times taken by a group of ramblers to complete a five mile walk.

| Time, $t$ (minutes) | Number of ramblers |
|---|---|
| $100 \leqslant t < 110$ | 6 |
| $110 \leqslant t < 130$ | 7 |
| $130 \leqslant t < 150$ | 8 |
| $150 \leqslant t < 200$ | 4 |

Calculate an estimate of the mean time taken by these ramblers to complete the walk.

SCATTER DIAGRAMS AND CORRELATION

Exam questions

1. Six pupils revise for a test.
The table shows the time each pupil spent revising and their mark in the test.

| **Time (hours)** | 2 | 3 | 5 | 7 | 8 | 10 |
|---|---|---|---|---|---|---|
| **Mark** | 30 | 26 | 34 | 38 | 45 | 48 |

(a) Plot the data as a scatter graph

(b) Draw a line of best fit on the scatter graph. *(1 mark)*

(c) Use your line of best fit to estimate the mark of a pupil who revised for 4 hours.

2. The table shows the school year and the reaction time of eight people who took part in the same test.

| **School year** | 5 | 7 | 8 | 9 | 10 | 11 | 11 | 13 |
|---|---|---|---|---|---|---|---|---|
| **Reaction time (seconds)** | 6 | 5 | 4.8 | 4.5 | 4 | 4.2 | 3.5 | 3 |

(a) Draw a scatter graph of these data.
(b) Draw a line of best fit on your scatter graph.
(c) Describe the relationship shown by your scatter graph.

3. The time, in minutes, that seven teenagers spent using their computer and spent watching TV on one day is recorded in the table.

| **Time spent using computer (minutes)** | 10 | 20 | 30 | 40 | 45 | 55 | 60 |
|---|---|---|---|---|---|---|---|
| **Time spent watching TV (minutes)** | 50 | 40 | 45 | 40 | 30 | 30 | 20 |

(a) Plot these data as a scatter graph

(b) Draw a line of best fit on your scatter graph.

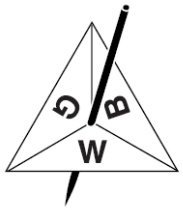
(c) Describe the relationship shown in the scatter graph.

# UNITS 1 - Homework 11H



## RELATIVE FREQUENCY - Exam questions

1. A triangular spinner has sections coloured white (W), green (G) and blue (B).




The spinner is spun 20 times and the colour it lands on each time is recorded.

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| W | W | B | G | G | W | B | G | G | W |
| G | B | G | B | G | W | G | B | G | B |

(a) Complete the relative frequency table.

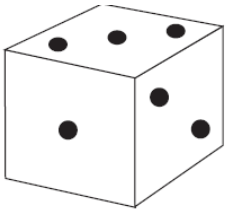
| Colour | White (W) | Green (G) | Blue (B) |
|---|---|---|---|
| Relative frequency | | | |

(b) The table below shows the relative frequencies after this spinner has been spun 100 times.

| Colour | White (W) | Green (G) | Blue (B) |
|---|---|---|---|
| Relative frequency | $\frac{21}{100}$ | $\frac{52}{100}$ | $\frac{27}{100}$ |

Which of the two relative frequencies for white gives the better estimate of the probability of the spinner landing on white?
Give a reason for your answer.

2. A dice is suspected of bias.
Here are the results of 20 throws.



| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 3 | 4 | 2 | 3 | 1 | 5 | 6 | 2 | 4 | 3 |
| 4 | 3 | 1 | 1 | 6 | 2 | 5 | 6 | 5 | 3 |

(a) Use these results to calculate the relative frequency of each score.

| Score | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| Relative frequency | | | | | | |

(b) Use the relative frequency to calculate how many times you would expect to score 3 in 60 throws of this dice.

(c) Compare your answer to part (b) with the number of times you would expect to score 3 in 60 throws of a **fair** dice.

# UNITS 1 - Homework 12H

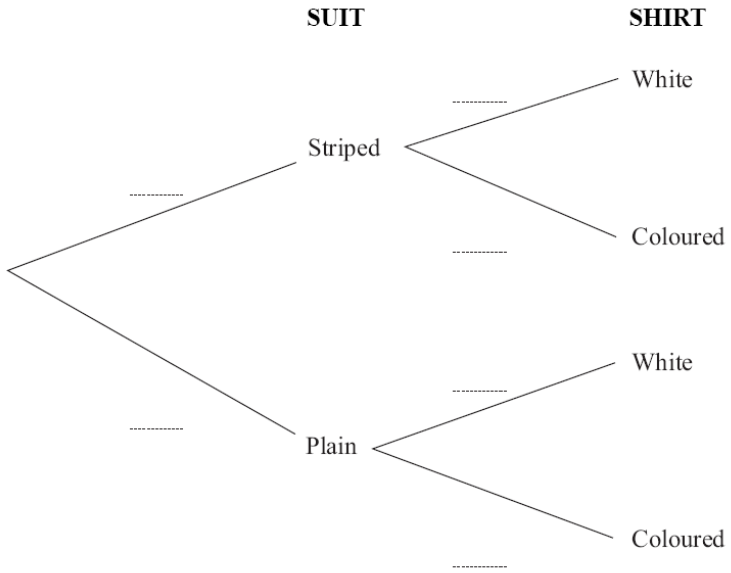


## TREE DIAGRAMS - Exam questions

1. Greg has four suits, one is striped and the other three are plain.
He also has ten shirts, four are white and the other six are coloured.

Greg chooses a suit at random and then chooses a shirt at random.

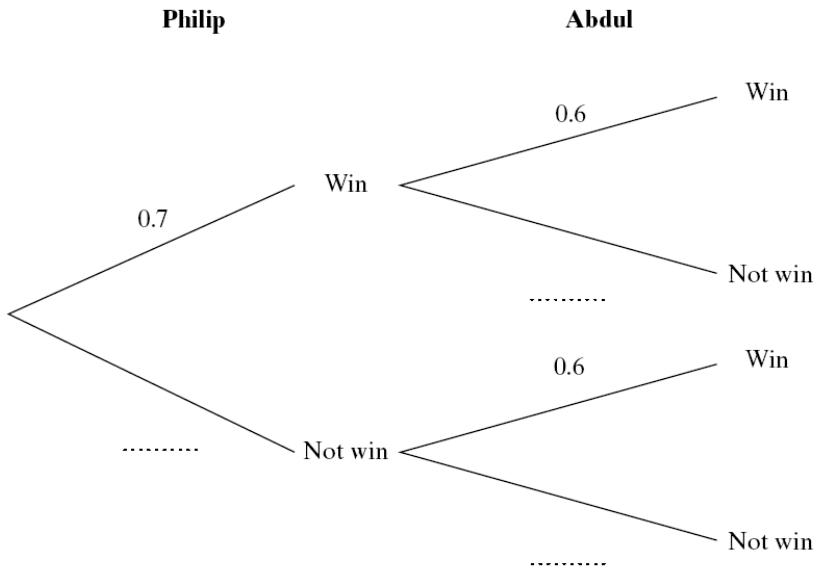
(a) Fill in the probabilities on the branches of the tree diagram.




(b) Calculate the probability that Greg chooses a plain suit and a coloured shirt.

2. Philip and Abdul run in different races.
The probability that Philip wins his race is 0.7
The probability that Abdul wins his race is 0.6

(a) Fill in the missing probabilities on the tree diagram.




(b) Calculate the probability that only one of the boys wins his race.

# UNITS 1 - Homework 13H



## COMBINED PROBABILITIES (AND RULE / OR RULE)

### Exam questions

1. A fair spinner has six sections of equal size.
One section is blue, two sections are green and three sections are red.
The spinner is spun twice.

   (a) Calculate the probability that it lands on the same colour both times.

   (b) When the spinner lands on a blue section 7 points are scored.
   When the spinner lands on a green section 5 points are scored.
   When the spinner lands on a red section 3 points are scored.

   Calculate the probability of scoring exactly ten points in two spins.

2. A bag contains 4 red, 3 yellow and 2 purple discs.
A disc is taken, at random, from the bag and is **not** replaced.
A second disc is then taken, at random, from the bag.

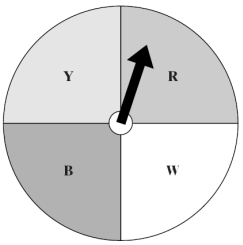
   Calculate the probability that the two discs taken from the bag are

   (a) both red,

   (b) different colours.

3. A fair spinner has four equal sections.

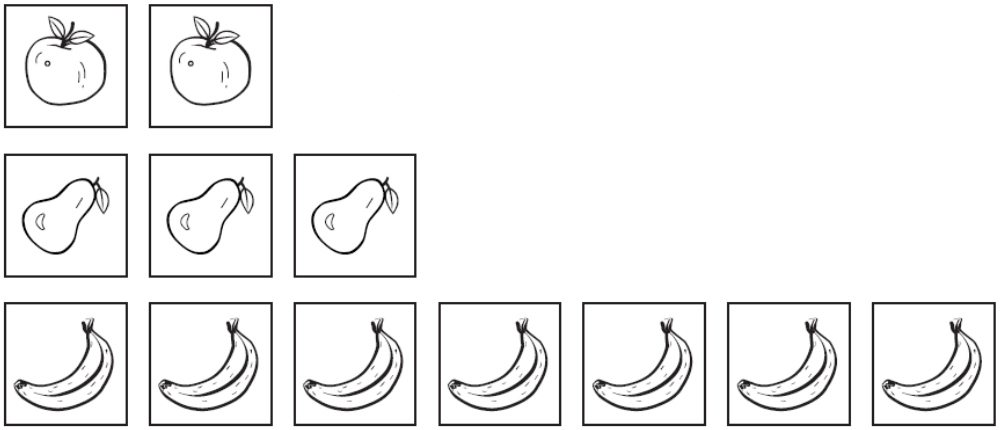
   The sections are coloured red (R), white (W), blue (B) and yellow (Y).




   The arrow on the spinner is spun three times.

   Calculate the probability that the arrow lands on the same colour at least twice.

4. Ingrid has 12 picture cards.
There are 2 apples, 3 pears and 7 bananas.



   Ingrid chooses 2 cards at random.

   Calculate the probability that both cards are the same.
   You **must** show your working.

# UNITS 1 - Homework 14H



## DEPENDENT EVENTS

### Exam questions

1. A computer is used to generate three-digit random numbers from 000 to 999,
e.g. 006, 000, 977, 125, …

Given that a generated number is a multiple of 3, find the probability that it is also a multiple of 4.

2. All the pupils at a stage school audition for parts in a musical.

If a pupil is male then the probability of getting a part is $\frac{4}{5}$

If a pupil is female then the probability of getting a part is $\frac{3}{10}$

The probability that a pupil is male is $\frac{1}{3}$

(a) Calculate the probability that a pupil chosen at random gets a part in the musical.

(b) 77 pupils get parts in the musical.

How many pupils are there in the school?

3. Jean enters an archery competition.

If it is raining the probability that she hits the target is 0.4

If it is not raining the probability that she hits the target is 0.7

The probability that it rains on the day of the competition is 0.2

(a) Draw a fully labelled tree diagram showing all the probabilities.

(b) Calculate the probability that Jean hits the target with her first arrow in the competition.

4. Some students decide to organise a day out.
They can only go on a Saturday or a Sunday.

$\frac{7}{12}$ of students choose a theme park.

The rest choose a water park.

$\frac{5}{7}$ of those choosing the theme park prefer Saturday.

$\frac{8}{15}$ of those choosing the water park prefer Sunday.

(a) One person is chosen at random.

Calculate the probability that this person prefers Saturday.

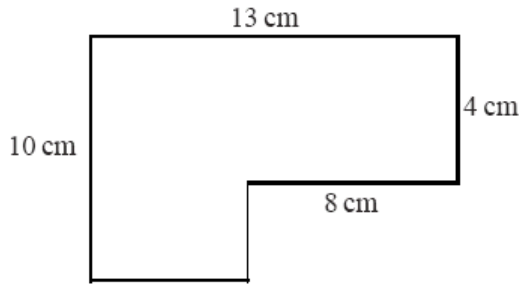
(b) Of the students, 88 prefer Saturday.

How many students are there altogether?

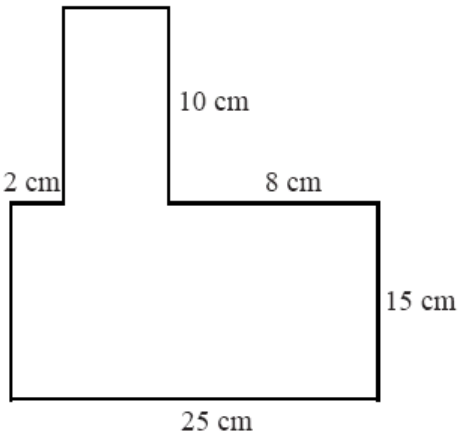
**Compound area + perimeter** **UNITS 5 - Homework 1H** **GRADE : 4**
**(mathswatch clip 73)**

1) Find the area and perimeter of each shape.

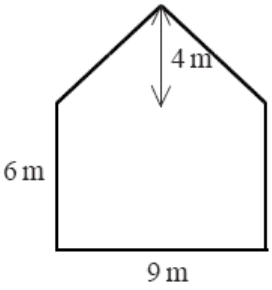
1) Find the area of each shape.



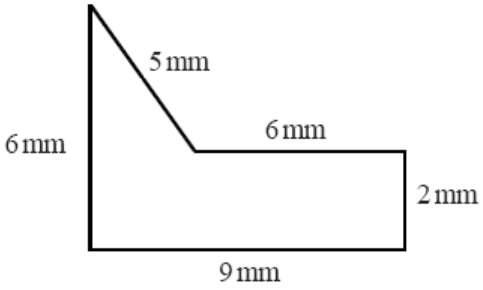

b)




c)

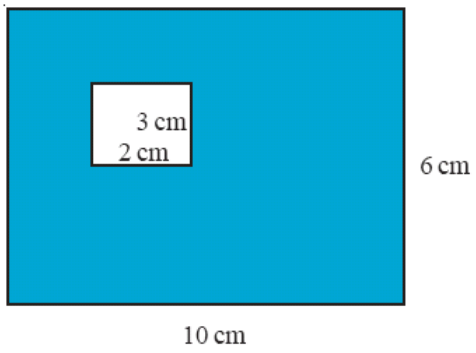



d)

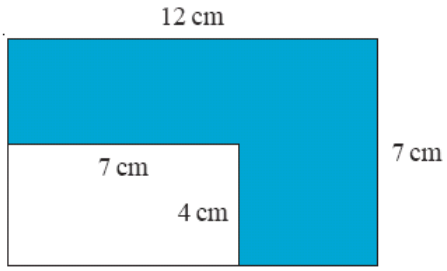



2) Find the shaded area of each shape.

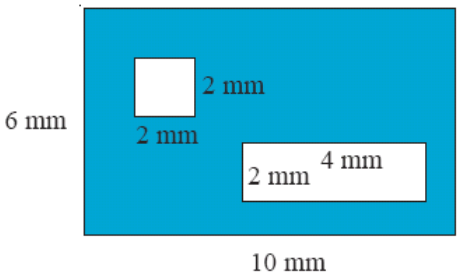
a)



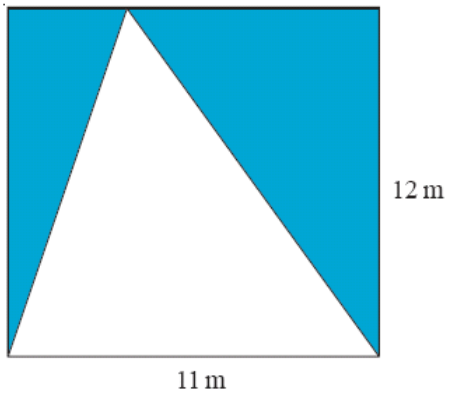

b)




c)




d)

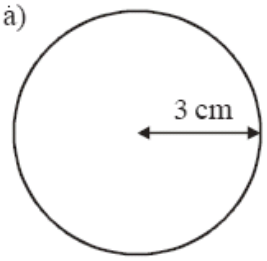


**Circumference of circles** **UNITS 5 - Homework 2H** **GRADE : 4**
**(mathswatch clip 72)**

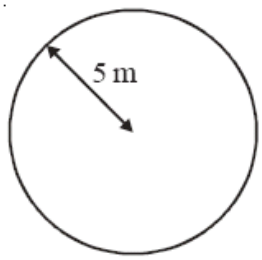
1) Find the circumference of the following shapes.
Take π to be 3.14.

Diagrams **NOT** accurately drawn

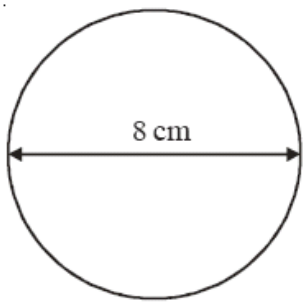
a)




b)

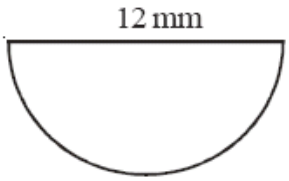



c)

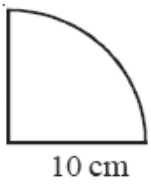



2) Work out the perimeter of the following shapes, taking π to be 3.14.

a)




b)




3) The **radius** of the top of a circular table is 60 cm.
The table also has a circular base with **diameter** 30 cm.

a) Work out the circumference of the top of the table.
Let π be 3.14

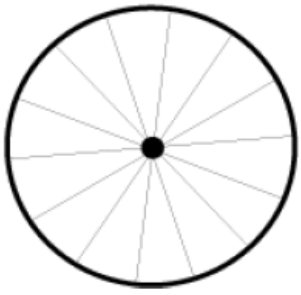
b) Work out the circumference of the base of the table.
Let π be 3.14

4) The diameter of a wheel on Kyle's bicycle is 0.75 m.

a) Calculate the circumference of the wheel.
Give your answer correct to 2 decimal places.

Kyle cycles 2000 metres.

b) Using your answer in (a), calculate the number of complete turns the wheel makes.



**Area of circles**
**(mathswatch clip 71)**

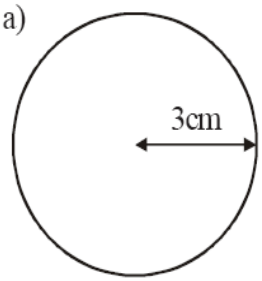
**UNITS 5 - Homework 3H**

**GRADE : 4-5**

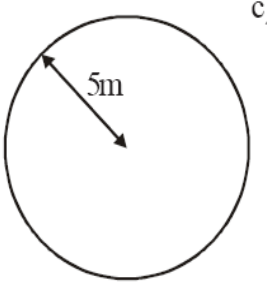
1) Find the areas of the following shapes.
Take π to be 3.14

Diagrams **NOT** accurately drawn

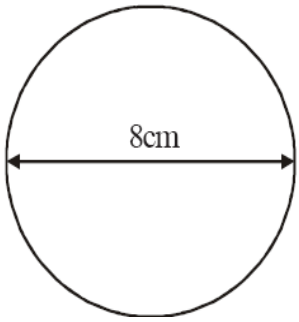
a)




b)

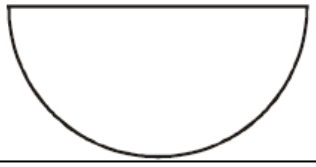



c)

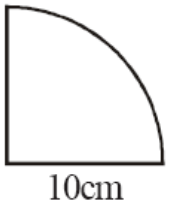



2) Work out the areas of the following shapes.

a)

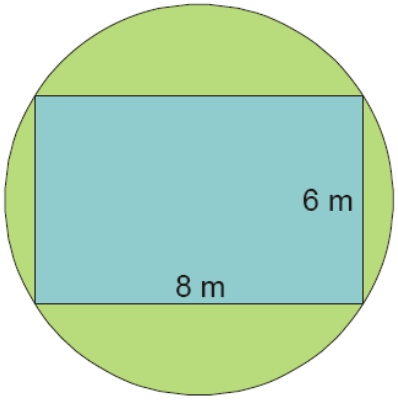



b)



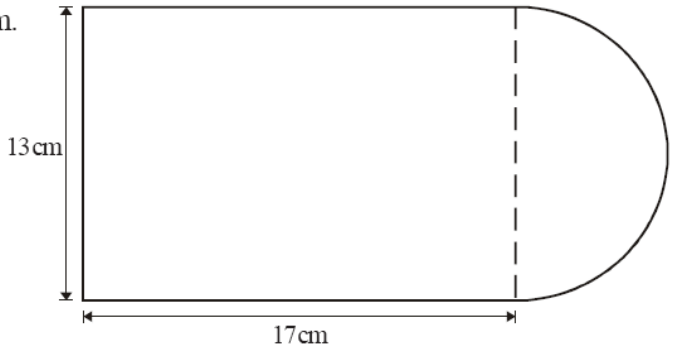

3) The diagram shows a circular garden comprising a rectangular pond enclosed by grass.
The circular garden has a diameter of 10 m.
The rectangular pond measures 8 m by 6 m.

Work out the area of the garden covered in grass.
Take π to be 3.14 and give your answer to the nearest $m^2$.




5) The diagram shows a shape, made from a semi-circle and a rectangle.
The diameter of the semi-circle is 13 cm.
The length of the rectangle is 17 cm.

Calculate the area of the shape.
Give your answer correct to 3 significant figures.

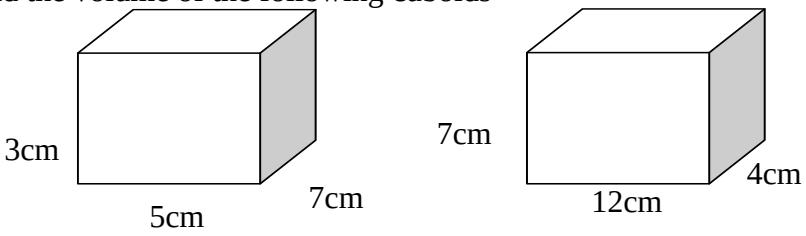


**Volume of cuboids + prisms**(mathswatch clip 34 + 122)

**GRADE : 4-5**

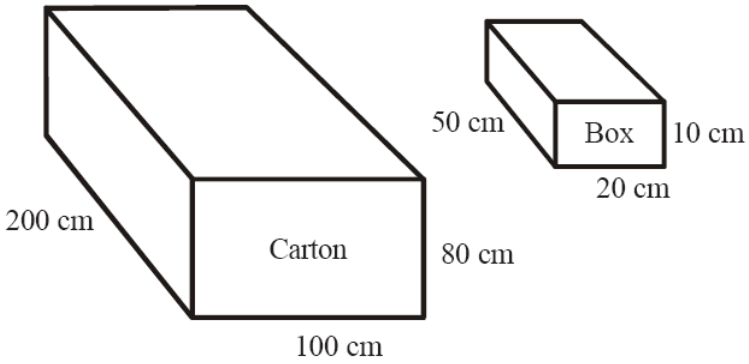
## UNITS 5 - Homework 4H

1) Find the volume of the following cuboids



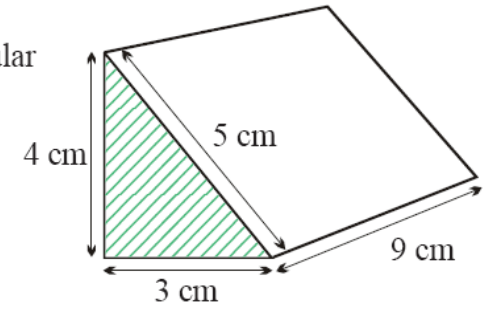

2)

Work out the maximum number of boxes which can fit in the carton.




3)

Calculate the volume of this triangular prism.

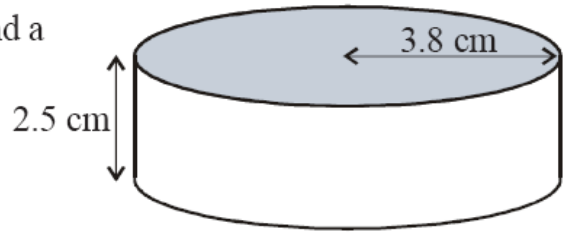



4)

An ice hockey puck is in the shape of a cylinder with a radius of 3.8 cm and a thickness of 2.5 cm.

Take $\pi$ to be 3.14

Work out the volume of the puck.



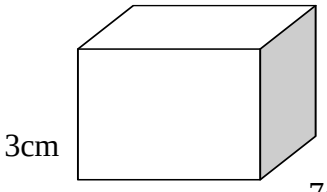

5) A cuboid has a volume of $80cm^3$ a width of 5cm and a depth of 2 cm find it's height?

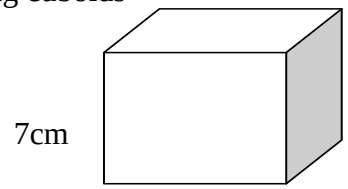
**Surface area**
**(mathswatch clip 121)**

**UNITS 5 - Homework 5H**

**GRADE : 5-6**

1) Find the surface area of the following cuboids

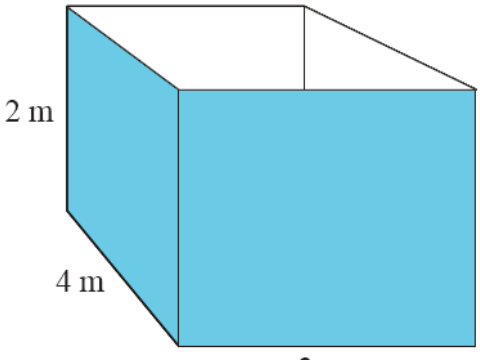



2)

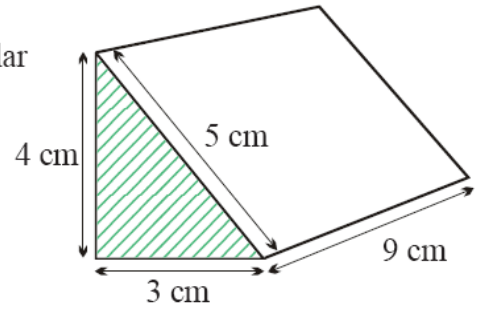
3) A water tank measures 2 m by 3 m by 4 m.
It has no top.
The outside of the tank, including the base, has to be painted.

Calculate the surface area which will be painted.




3)

Calculate the volume of this triangular prism.




5) A cuboid has a surface area of $36cm^2$ a width of 5cm and a depth of 2 cm find it's height?

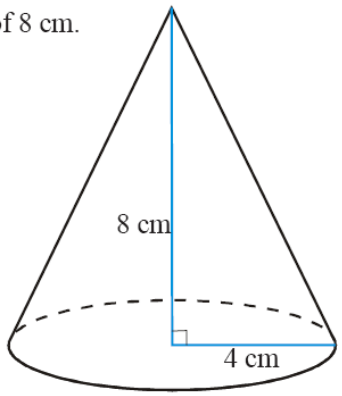
**Volume of Spheres and Cones**
**(mathswatch clip 177)**

**UNITS 5 - Homework 6H**

**GRADE : 7-8**

1) A cone has a base radius of 4 cm and a vertical height of 8 cm.

a) Calculate the volume of the cone.
Give your answer correct to 3 significant figures.

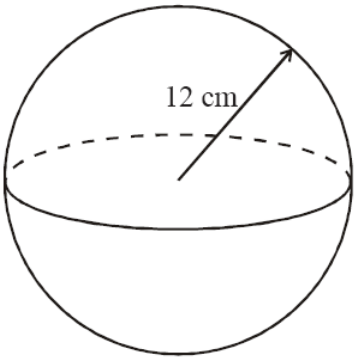



c) Find the curved surface area of the cone.
Give your answer correct to 3 significant figures.

2) A sphere has a radius of 12cm.

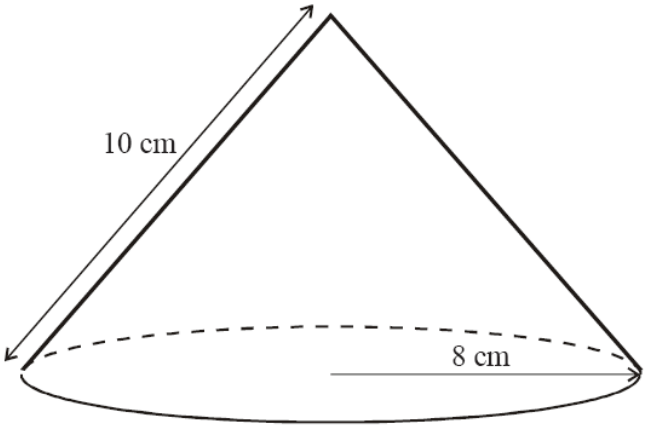
a) Calculate the volume of the sphere.
Give your answer correct to 3 significant figures.

b) Find the curved surface area of the sphere.
Give your answer correct to 3 significant figures.

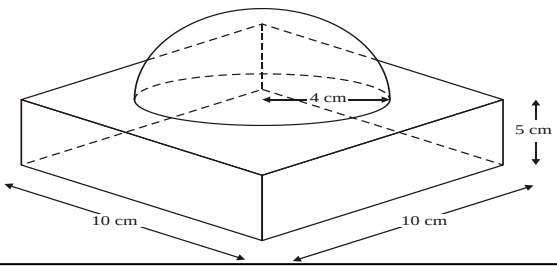



3) A cone has a base radius of 8 cm and a slant height of 10 cm.

Calculate the volume of the cone.
Leave your answer in terms of $\pi$




4) A marble paperweight consists of a cuboid and a hemisphere as shown in the diagram.
The hemisphere has a radius of 4 cm.



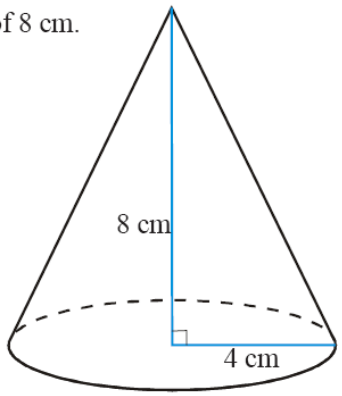
**Volume of Spheres and Cones**
**(mathswatch clip 177)**

**UNITS 5 - Homework 6H**

**GRADE : 7-8**

1) A cone has a base radius of 4 cm and a vertical height of 8 cm.

a) Calculate the volume of the cone.
Give your answer correct to 3 significant figures.

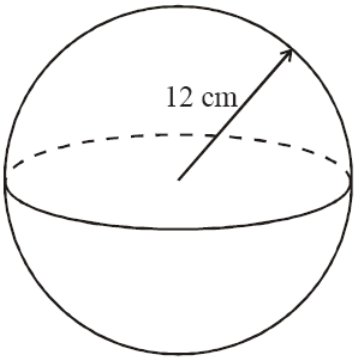



c) Find the curved surface area of the cone.
Give your answer correct to 3 significant figures.

2) A sphere has a radius of 12cm.

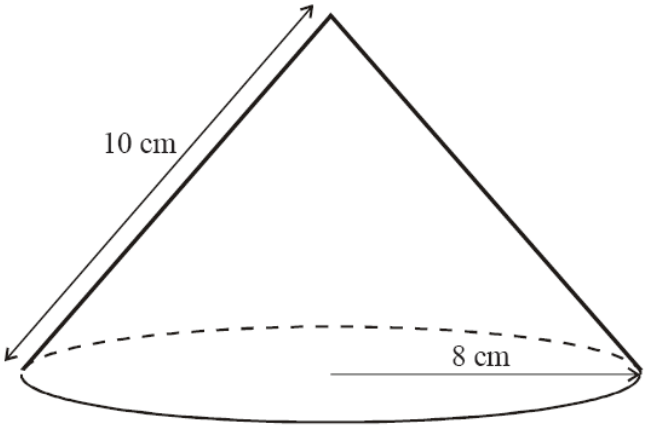
a) Calculate the volume of the sphere.
Give your answer correct to 3 significant figures.

b) Find the curved surface area of the sphere.
Give your answer correct to 3 significant figures.

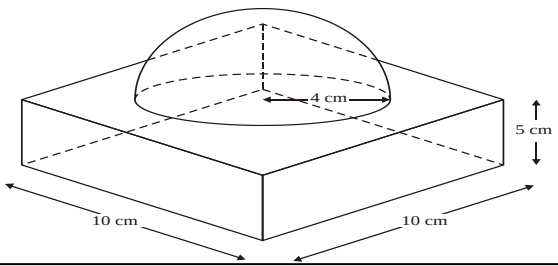



3) A cone has a base radius of 8 cm and a slant height of 10 cm.

Calculate the volume of the cone.
Leave your answer in terms of $\pi$

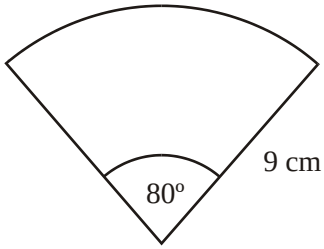



4) A marble paperweight consists of a cuboid and a hemisphere as shown in the diagram.
The hemisphere has a radius of 4 cm.



**Length / Area of arcs, sectors** **UNITS 5 - Homework 7H** **GRADE : 7-8**

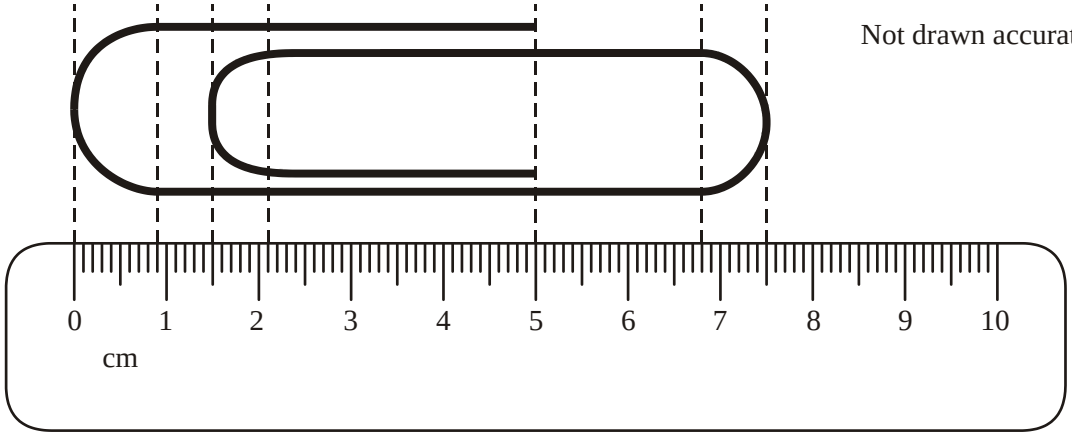
1) The diagram shows a sector of a circle of radius 9 centimetres.




Not drawn accurately

Find the perimeter of the sector.

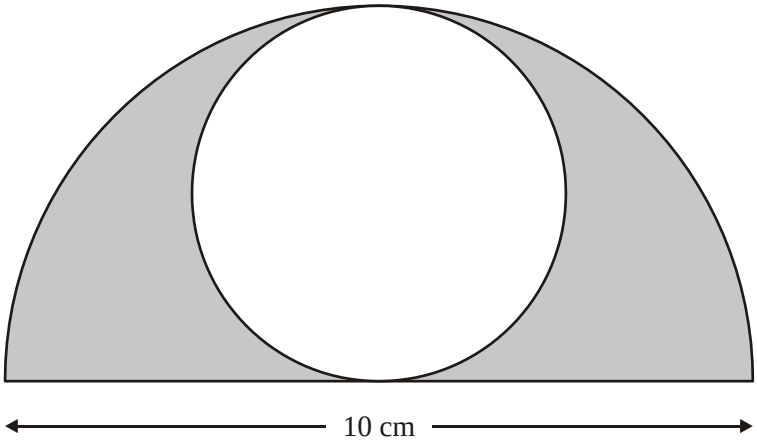
2) A giant paper clip is placed alongside a centimetre ruler.
The curved ends are semicircles.




Not drawn accurately

Calculate the length of wire used to make the clip.

3) A circle fits inside a semicircle of diameter 10 cm as shown.



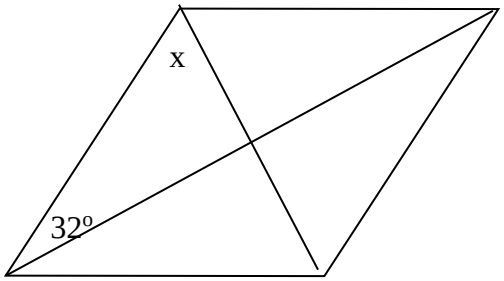

Calculate the shaded area.

**Polygons**
**(mathswatch clip 70)**

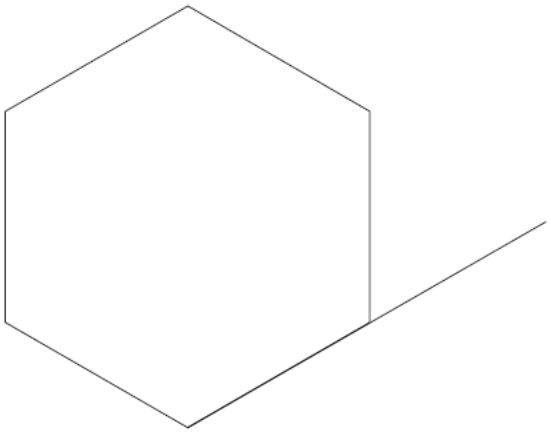
**UNITS 5 - Homework 8H**

**GRADE : 5**

1) find angle x if the following shape is a rhombus




2)



a) Work out the size of an **exterior** angle of a regular hexagon.

b) Work out the size of an **interior** angle of a regular hexagon.

3)

The size of each **exterior** angle of a regular polygon is 90°.
Work out the number of sides of the regular polygon.

The size of each **exterior** angle of a regular polygon is 40°.
Work out the number of sides of the regular polygon.

The size of each **interior** angle of a regular polygon is 120°.
Work out the number of sides of the regular polygon.

The size of each **interior** angle of a regular polygon is 150°.
Work out the number of sides of the regular polygon.

**Sequences** **UNITS 5 - Homework 9H** **GRADE : 5**

1) Write the first five terms of the following sequences whose $n^{th\ terms}$ are

$n+3$ $n^2+3$ $3n$ $8n-2$

$2n^2$ $n^3$ $n^2-5$

2) Find the $n^{th}$ term of the following;
3, 8, 13, 18, 23, ….
20, 13, 6, -1, ….
2, 8, 18, 32, 50, …..
½ , 1, 4 ½ , 8, 12 ½ , ……

A sequence of numbers is shown.

5 9 13 17 21

(a) Find an expression for the *nth* term of the sequence.

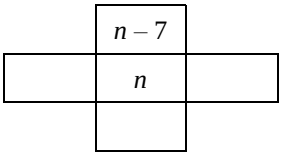
(b) Explain why 83 will not be a term in this sequence.

(a) Part of a number grid is shown below.

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 29 | 30 | 31 | 32 | 33 | 34 | 35 |

The shaded cross is called $C_{11}$ because it has the number 11 at the centre.

This is $C_n$




Fill in the empty boxes.

(b) Kevin notices the following number sequence in the grid.

1, 9, 17, 25, 33,...

Write down the *nth* term of this sequence.

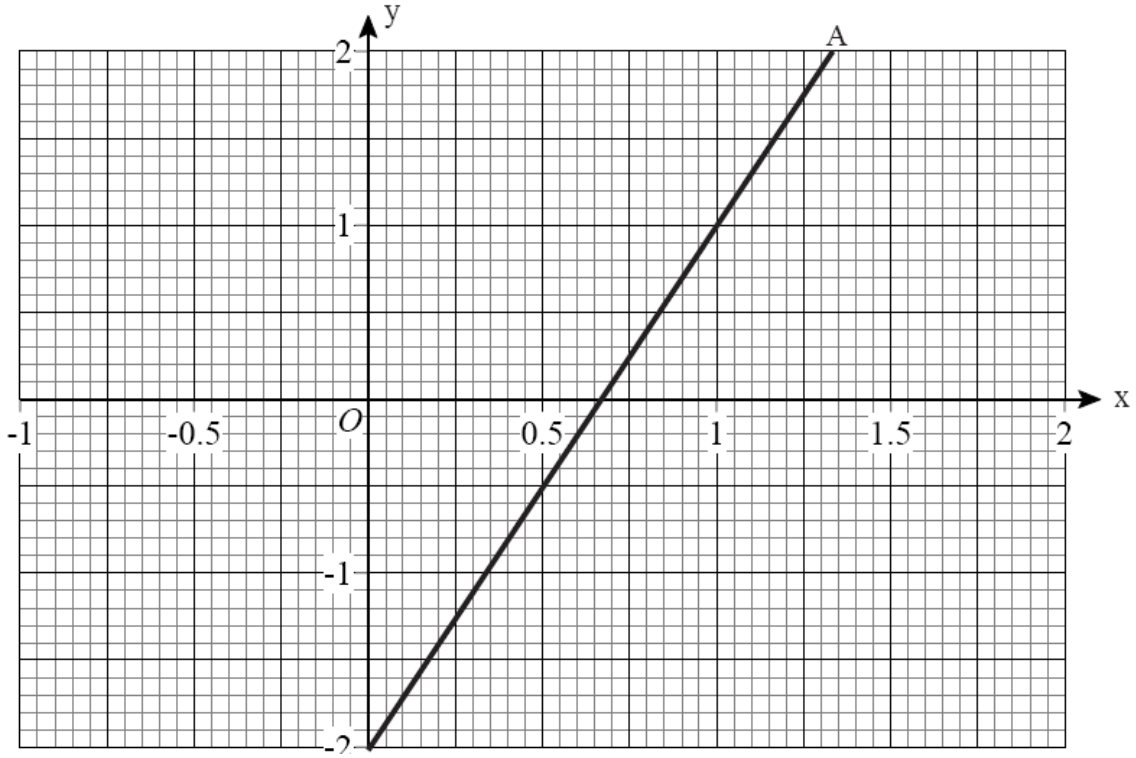
**Straight lines** **UNITS 5 - Homework 10H** **GRADE : 5**

**( mathswatch clip 114 + 143 )**

1) a) Find the equation of line A.

b) Draw the line B, with equation $y = x - 1$.

c) Draw the line C, with equation $y = 1 - 2x$.




2) A straight line passes through points (0, 4) and (3, 13).
What is its equation?

4) A straight line passes through points (0, 7) and (2, -1).
What is its equation?

5) A straight line is parallel to $y = 3x - 2$ and goes through (1, 8).
What is its equation?

6 )
Find the midpoints of the following co-ordinates

i ) (0,4) (3, 13)

ii) (0,7) (2, -1)

iii) (10,5) (22, 18)

**Solving Equations** **UNITS 5 - Homework 11H** **GRADE :5**

**(Mathswatch clip 105)**

1) $4y + 3 = 2y + 10$

2) $2x + 17 = 5x - 4$

3) $2x + 7 = 16 - 4x$

4) $20x - 15 = 18x - 7$

5) $5(x + 3) = 2(x + 6)$

6) $4(2y + 1) = 2(12 - y)$

7) $7 - 3x = 2(x + 1)$

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

9) $\frac{2x+4}{3} = 7$

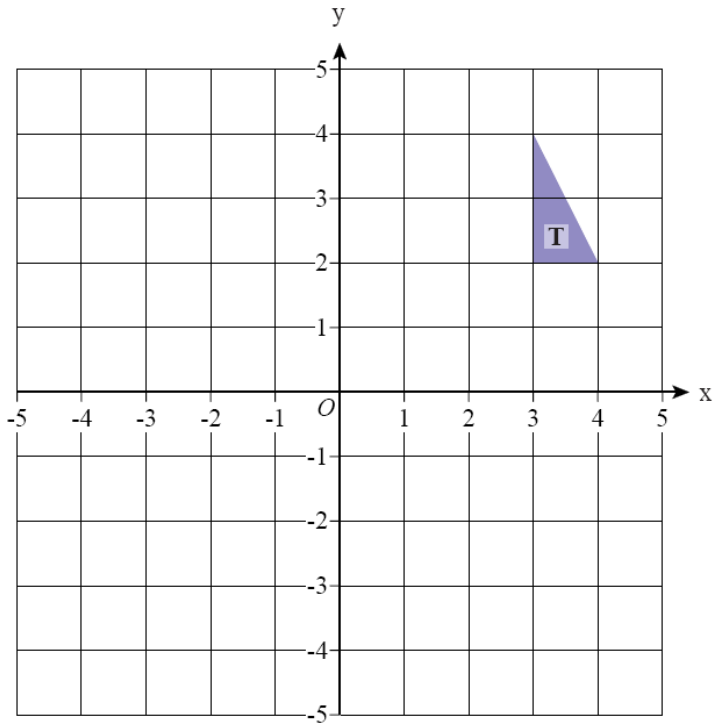
10) $\frac{40-x}{3} = 4 + x$

11) $\frac{2x-1}{6} + \frac{x+3}{3} = \frac{5}{2}$

12) $\frac{y-2}{3} + \frac{y+6}{4} = 16$

1) a) Rotate triangle T 90° anti-clockwise about the point (0, 0).
Label your new triangle U

b) Rotate triangle T 180° about the point (2, 0).
Label your new triangle V




**Reflections and rotations** **UNITS 5 - Homework 12H** **GRADE :4**

**(Mathswatch clip 74 + 75)**

**Circle theorems** **UNITS 5 - Homework 13H** **GRADE :6**

**(Mathswatch clip 150)**

1) In the diagram, A, B and C are points on the circumference of a circle, centre O. PA and PB are tangents to the circle. Angle ACB = 72˚.

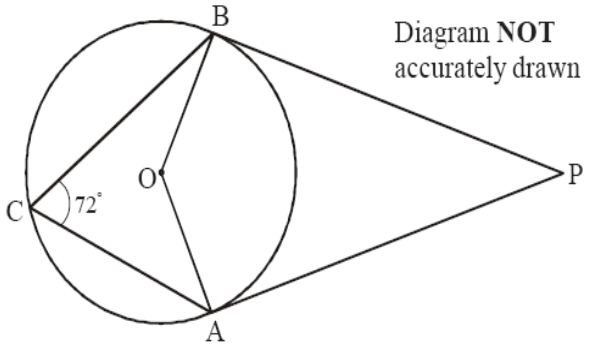


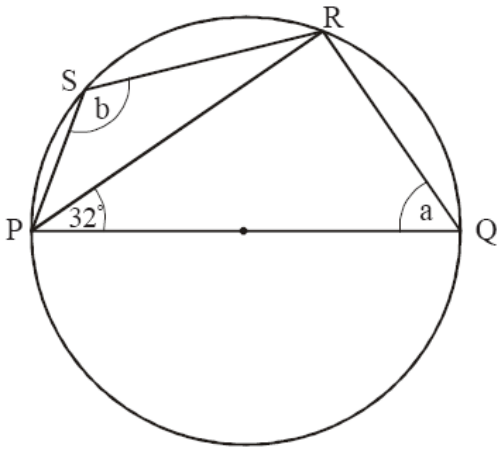

Diagram **NOT** accurately drawn

a) (i) Work out the size of angle AOB.

(ii) Give a reason for your answer.

b) Work out the size of angle APB.

2) P, Q, R and S are points on the circle. PQ is a diameter of the circle. Angle RPQ = 32˚.




a) (i) Work out the size of angle PQR.

(ii) Give reasons for your answer.

b) (i) Work out the size of angle PSR.

(ii) Give a reason for your answer.

3) The diagram shows a circle, centre O. AC is a diameter. Angle BAC = 31˚. D is a point on AC such that angle BDA is a right angle.

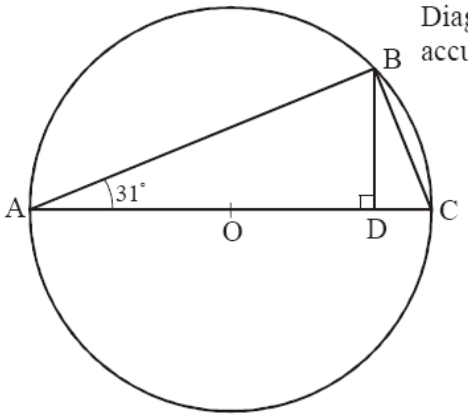



Diagram **NOT** accurately drawn

a) Work out the size of angle BCA. Give reasons for your answer.

b) Calculate the size of angle DBC.

c) Calculate the size of angle BOA.

**Trial and improvement** **UNITS 5 - Homework 14H** **GRADE :5**

**(Mathswatch clip 110)**

1) The equation

$$x^3 - x = 29$$

has a solution between 3 and 4
Use a trial and improvement method to find this solution.
Give your answer correct to 1 decimal place.
You must show **all** your working.

2) The equation

$$x^3 - 4x = 25$$

has a solution between 3 and 4
Use a trial and improvement method to find this solution.
Give your answer correct to 1 decimal place.
You must show **all** your working.

3) The equation

$$x^3 - 2x = 68$$

has a solution between 4 and 5
Use a trial and improvement method to find this solution.
Give your answer correct to 1 decimal place.
You must show **all** your working.

4) The equation

$$x^3 + 4x = 101$$

has one solution which is a positive number.

Use a trial and improvement method to find this solution.
Give your answer correct to 1 decimal place.
You must show **all** your working.

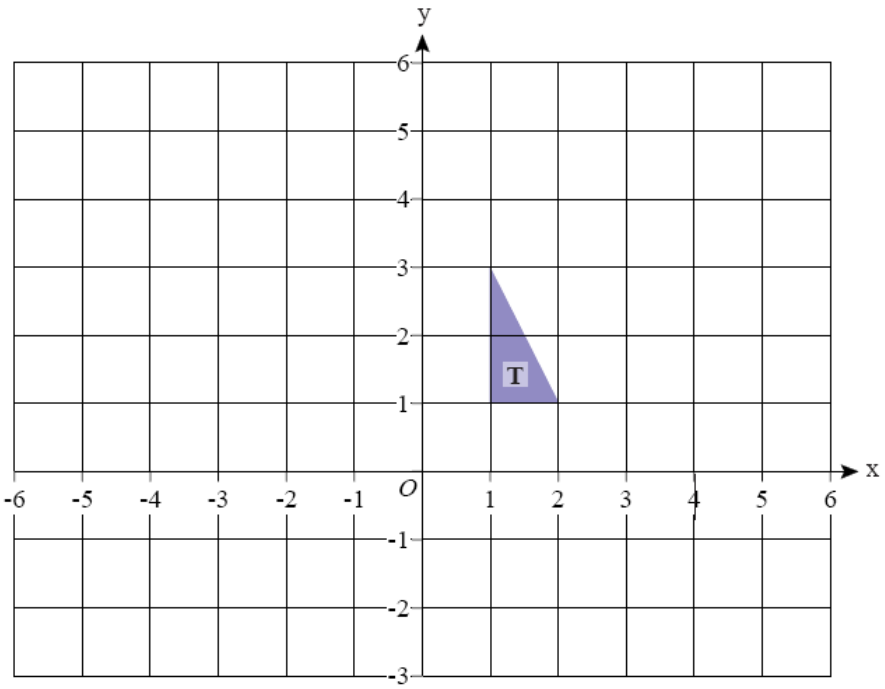
**Translation**
**(Mathswatch clip 77)**

**UNITS 5 - Homework 15H**

**GRADE :5**

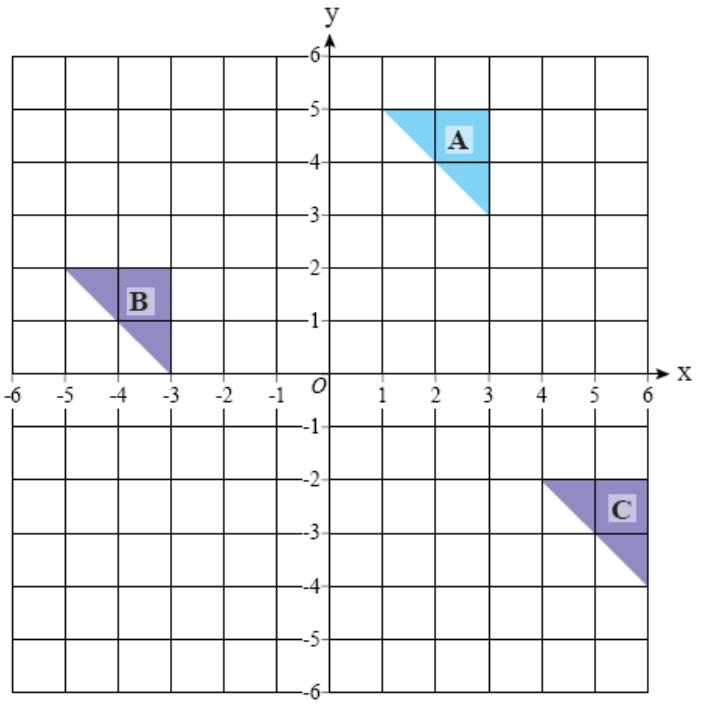
1) a) Translate triangle T by vector $\begin{bmatrix} -4 \\ 2 \end{bmatrix}$ and label it U

b) Translate triangle T by vector $\begin{bmatrix} 3 \\ -2 \end{bmatrix}$ and label it V




2) a) Describe fully the single transformation which maps triangle A to triangle B.

b) Describe fully the single transformation which maps triangle A to triangle C.



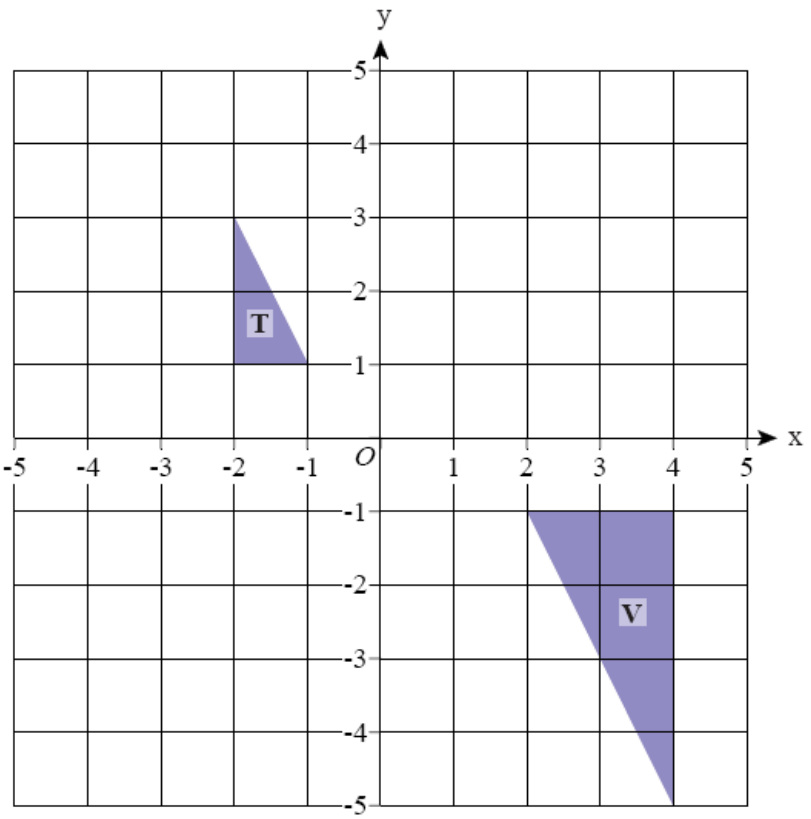
**Enlargement**
**(Mathswatch clip 76)**

**UNITS 5 - Homework 16H**

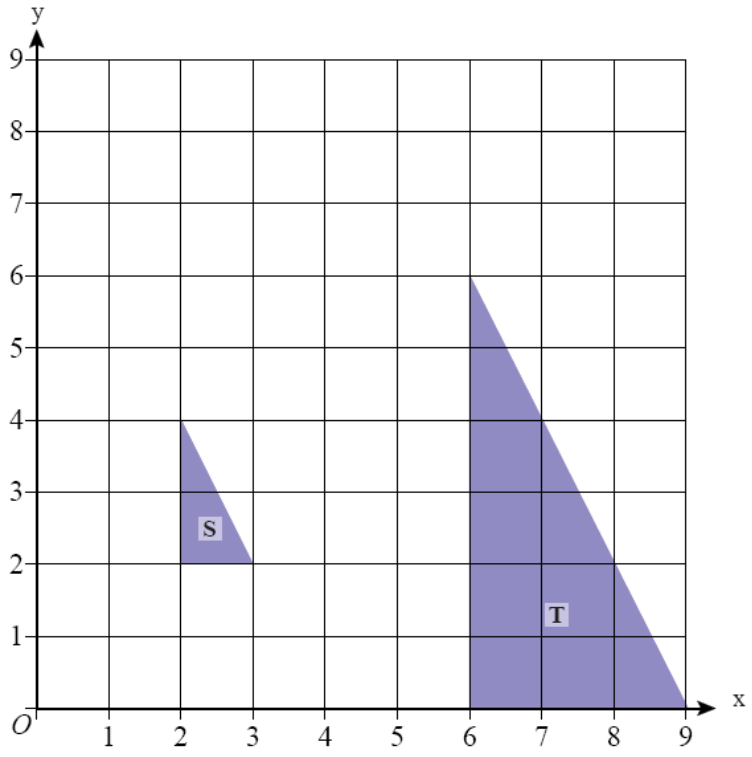
**GRADE :5**

1) a) Enlarge triangle T by scale factor 2 using point (-5, 2) as the centre of enlargement.
Label your new triangle U.

b) Enlarge triangle V by scale factor a half using the point (-2, -3) as the centre of enlargement.
Label your new triangle W.

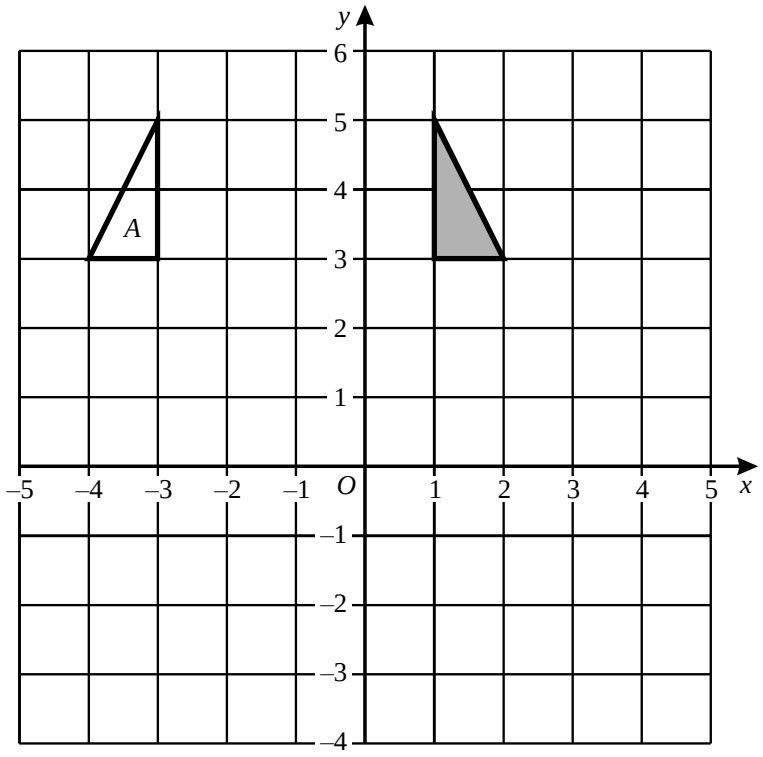



2) Describe fully the single transformation which maps triangle S to triangle T



**Transformations** **UNITS 5 - Homework 17H** **GRADE :5-6**

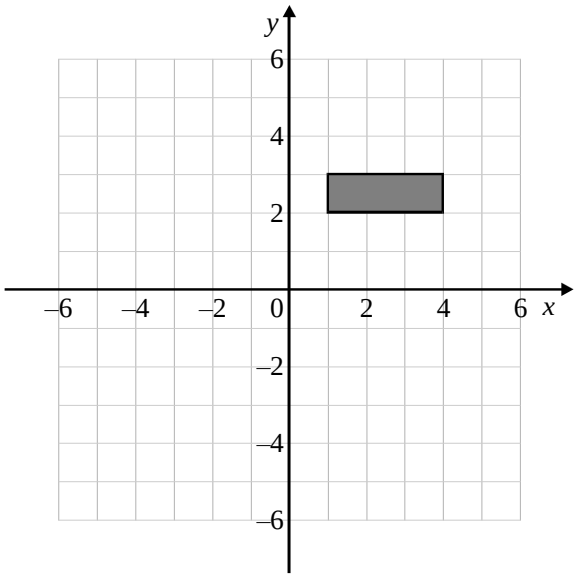
**(Mathswatch clip 74,75,76,77)**




(i) Describe fully the **single** transformation that takes the shaded triangle to triangle *A*.

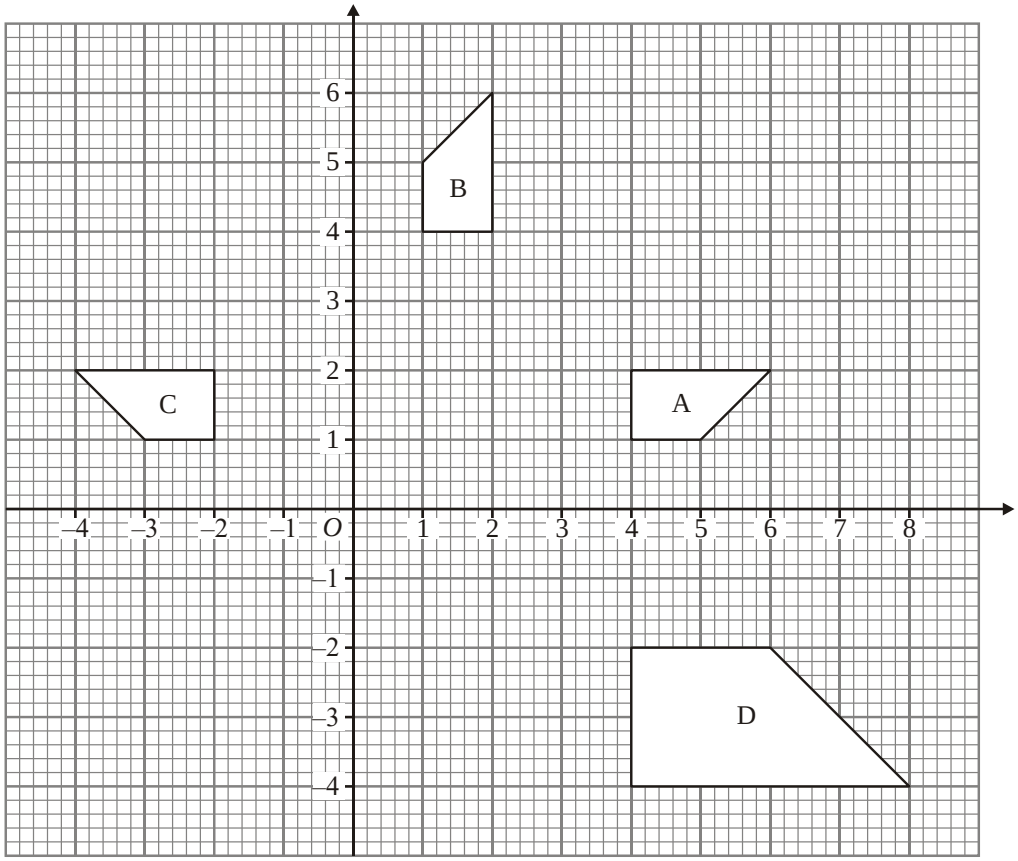
(ii) On the grid above translate the **shaded** triangle by 2 squares to the right and

The rectangle is rotated 90’ clockwise about the point (– 1, 0) and then translated by vector $\begin{pmatrix} -4 \\ 5 \end{pmatrix}$




Draw the Final position of the rectangle after these transformations.

The diagram shows four shapes, A, B, C and D.

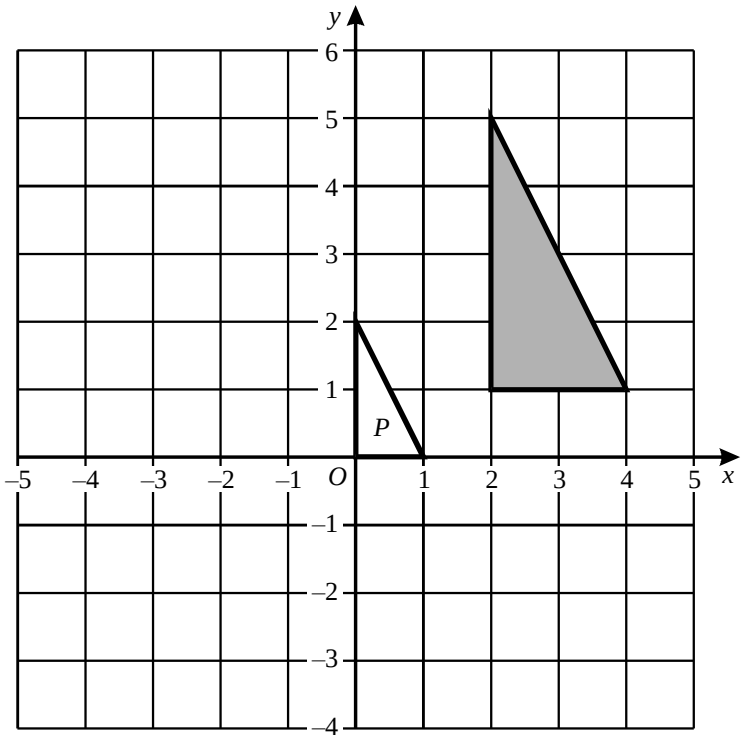



(a) Describe fully the single transformation that takes shape A onto shape B.

(b) Describe fully the single transformation that takes shape B onto shape C.

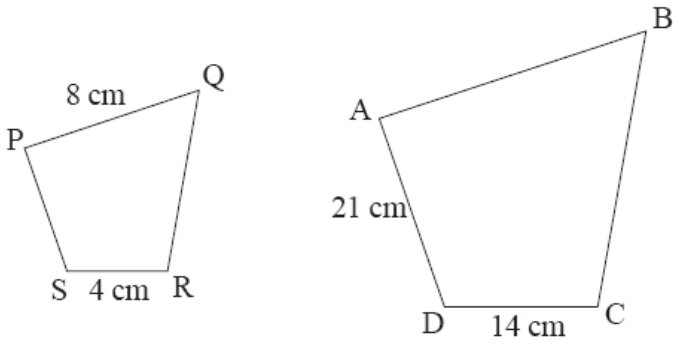
(c) Describe fully the single transformation that takes shape C onto shape D.

(b) Triangle P is an enlargement of the shaded triangle. Find the scale factor and centre of enlargement.



**Similar Shapes** **UNITS 5 - Homework 18H** **GRADE :5-6**
**(Mathswatch clip 123)**

1) The diagram shows two quadrilaterals that are mathematically **similar**.

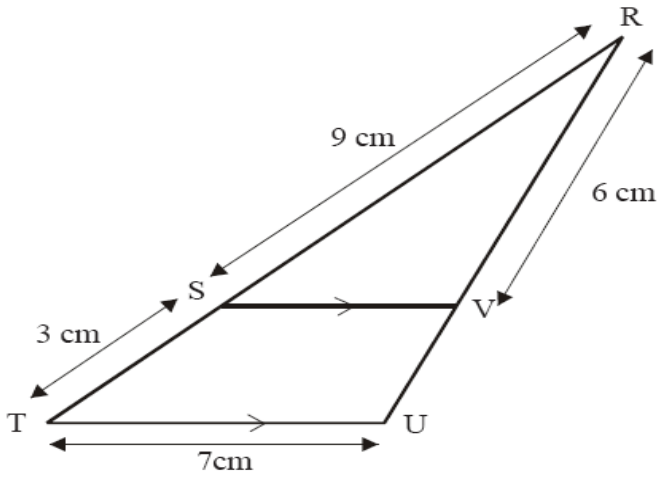



a) Calculate the length of AB

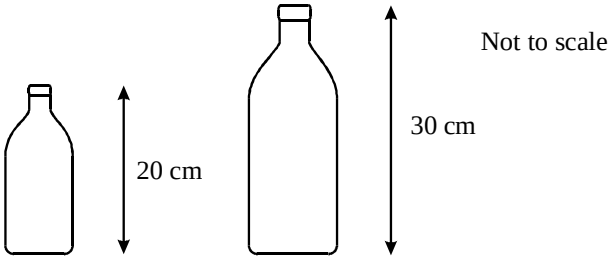
b) Calculate the length of PS

2) SV is parallel to TU.
RST and RVU are straight lines.
RS = 9 cm, ST = 3 cm, TU = 7 cm, RV = 6 cm

Calculate the length of VU.




Two similar bottles are shown below.
The smaller bottle is 20 cm tall and holds 480 ml of water.
The larger bottle is 30 cm tall.




How much water does the larger bottle hold?

**Dimensions of Formulae** **UNITS 5 - Homework 19H** **GRADE :5-6**

**(Mathswatch clip 124)**

1) The table shows some expressions.
The letters a, b, c and d represent lengths.
$\pi$ and 3 are numbers that have no dimensions.

Underneath each one write

L if it is a length

A if it is an area

V if it is a volume

N if it is none of the above.

| $\frac{\pi abc}{3d}$ | $\pi a^3$ | $3a^2$ | $\pi a^2 + b$ | $\pi(a + b)$ | $3(c^2 + d^2)$ | $3ad^2$ |
|---|---|---|---|---|---|---|
| | | | | | | |

| $2a^2$ | $\frac{\pi ab^3}{2d}$ | $\pi bc$ | $ac + bd$ | $\pi d(a + b)$ | $2(c + d)^3$ | $2\pi bc^2$ |
|---|---|---|---|---|---|---|
| | | | | | | |

2) a, b, and c represent lengths combine a, b, c, to find five formulae that could represent

i) volume

ii) area

**Compound Measures** **UNITS 5 - Homework 20H** **GRADE :5-6**

**(Mathswatch clip 126)**

1) Jane runs 200 metres in 21.4 seconds.

Work out Jane's average speed in metres per second.
Give your answer correct to 1 decimal place.

2) A car travels at a steady speed and takes five hours to travel 310 miles.

Work out the average speed of the car in miles per hour.

3) A plane flies 1440 miles at a speed of 240 mph.

How long does it take?

4) A marathon runner runs at 7.6 mph for three and a half hours.

How many miles has he run?

5) A car takes 15 minutes to travel 24 miles.

Find its speed in **mph**.

6) A cyclist takes 10 minutes to travel 2.4 miles.

Calculate the average speed in mph.

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7) An ice hockey puck has a volume of 113 $cm^3$.

It is made out of rubber with a density of 1.5 grams per $cm^3$.

Work out the mass of the ice hockey puck.

8) An apple has a mass of 160 g and a volume of 100 $cm^3$.

Find its density in $g/cm^3$.

9) A steel ball has a volume of 1500 $cm^3$.

The density of the ball is 95 $g/cm^3$.

Find the mass of the ball in kg.

**Bounds** **UNITS 5 - Homework 21H** **GRADE : 6**

**(Mathswatch clip 125)**

1. A silver necklace has a mass of 123 grams, correct to the nearest gram.
   a) Write down the least possible mass of the necklace.
   b) Write down the greatest possible mass of the necklace.

2. Each of these measurements was made correct to one decimal place.
   Write the maximum and minimum possible measurement in each case.

   a) 4.6 cm  b) 0.8 kg  c) 12.5 litres  d) 25.0 km/h

   e) 10.3 s  f) 36.1 m  g) 136.7 m/s  h) 0.1 g

3. Each side of a regular octagon has a length of 20.6 cm, correct to the nearest millimetre.
   a) Write down the least possible length of each side.
   b) Write down the greatest possible length of each side.
   c) Write down the greatest possible perimeter of the octagon.

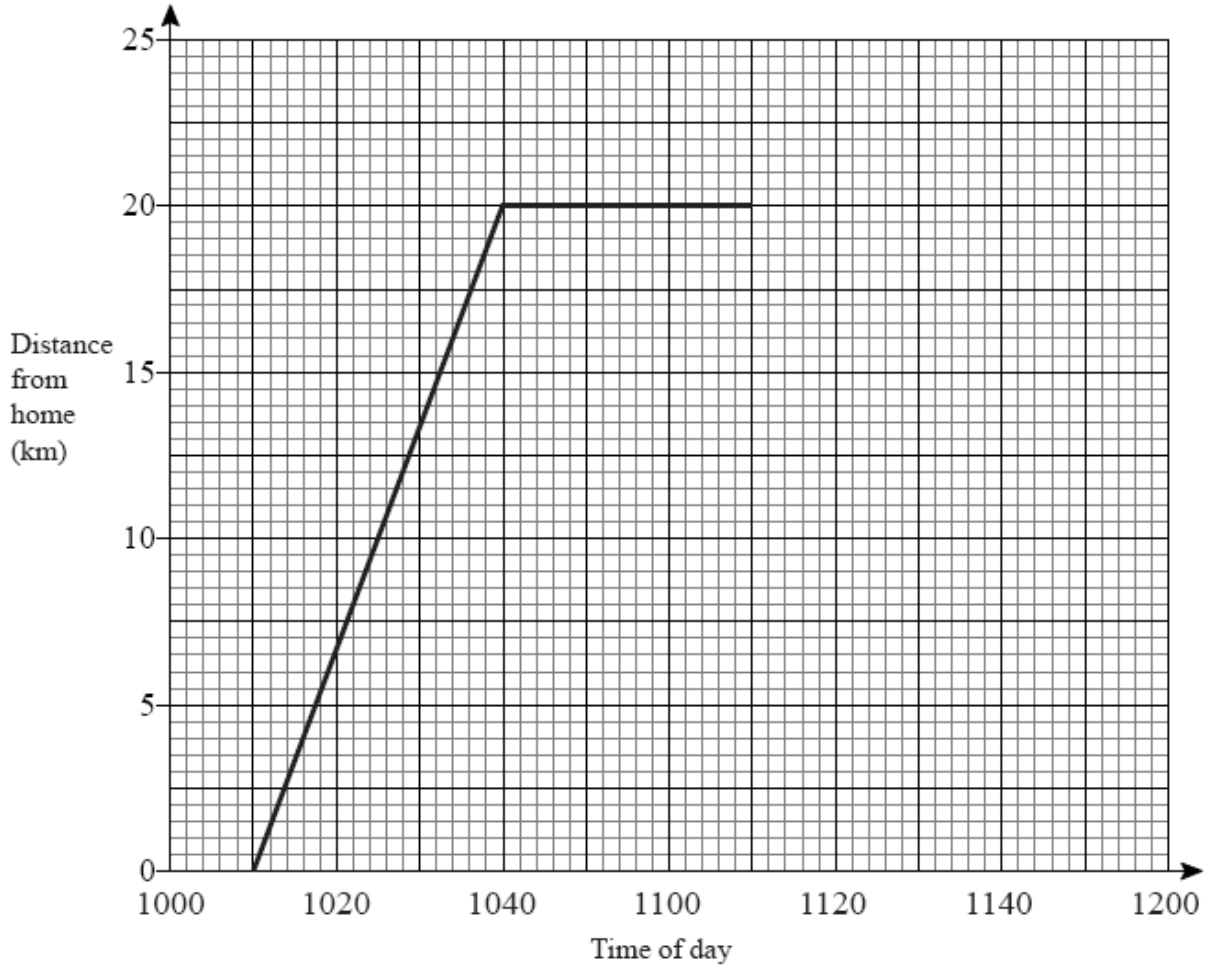
4. A girl has a pencil that is of length 12 cm, measured to the nearest centimetre.
   Her pencil case has a diagonal of length 12.3 cm, measured to the nearest millimetre.
   Explain why it might not be possible for her to fit the pen in the pencil case.

5. A square has sides of length 7 cm, correct to the nearest centimetre.
   a) Calculate the lower bound for the perimeter of the square.
   b) Calculate the upper bound for the area of the square.

6) Sameera runs 100m (to the nearest 10m) in 12 seconds (correct to the nearest second).
Last time she ran the race her maximum possible speed was 8.2 metres per second – can she be sure that she has run faster his time?
Give a reason for this answer

**Real life graphs** **UNITS 5 - Homework 22H** **GRADE : 5**
**(Mathswatch clip 117)**

1) Sarah travelled 20 km from home to her friend's house.
She stayed at her friend's house for some time before returning home.
Here is the travel graph for part of Sarah's journey.




a) At what time did Sarah leave home?

b) How far was Sarah from home at 10 30?

Sarah left her friend's house at 11 10 to return home.

c) Work out the time in minutes Sarah spent at her friend's house.

Sarah returned home at a steady speed.
She arrived home at 11 50

d) Complete the travel graph.

e) Work out Sarah's average speed on her journey from her home to her friend's house.
Give your answer in kilometres per hour.

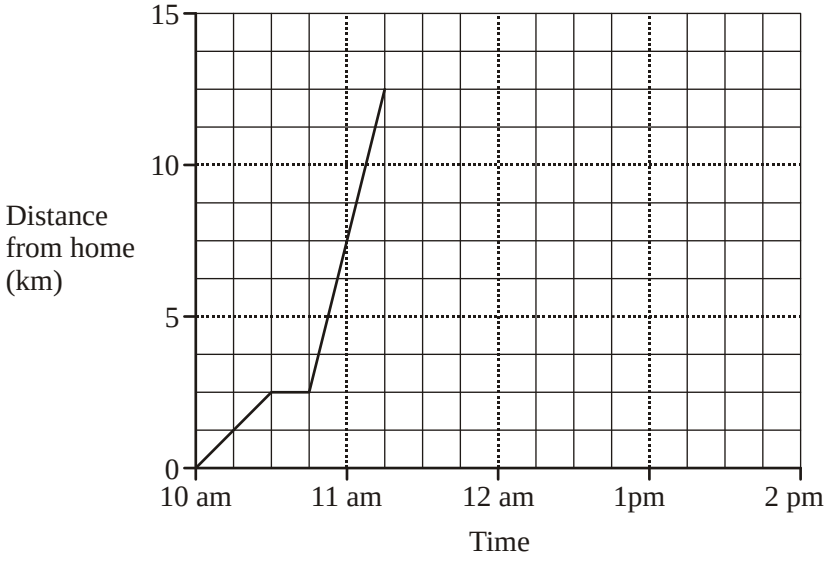
f) Work out Sarah's average speed on her journey home from her friend's house.
Give your answer in kilometres per hour.

**Real life graphs**
**(Mathswatch clip 117)**

**UNITS 5 - Homework 23H**

**GRADE : 5**

Mr Smith leaves the home at 10 am to go to the shopping mall.
He walks to the station where he catches a train.
He gets off the train at the mall.
The travel graph shows his journey.




After shopping Mr Smith goes home by taxi.
The taxi leaves the mall at 1 pm and arrives at his home at 1.45 pm.

(a) Complete the travel graph.

**(2)**

(b) Calculate the average speed of the taxi.

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.....

Answer .....km per hour

**(2)**

**Substitution** **UNITS 5 - Homework 24H** **GRADE : 5**

**(Mathswatch clip 65)**

1) Work out the value of $5x$ when

a) $x = 2$ b) $x = 6$ c) $x = 10$

2) Work out the value of $3x$ when

a) $x = -2$ b) $x = 10$ c) $x = -12$

3) Work out the value of $x^2$ when

a) $x = 3$ b) $x = -4$ c) $x = -10$

4) Work out the value of $2x^2$ when

a) $x = 5$ b) $x = -4$ c) $x = 10$

5) Work out the value of $3x + 5$ when

a) $x = 2$ b) $x = 6$ c) $x = -1$

6) Work out the value of $4 + 2x$ when

a) $x = 7$ b) $x = -1$ c) $x = -3$

7) Work out the value of $3x + 2y$ when

a) $x = 1$ and $y = 2$ b) $x = 4$ and $y = 3$ c) $x = 5$ and $y = -4$

8) Work out the value of $6x - 3y$ when

a) $x = 2$ and $y = 1$ b) $x = 1$ and $y = -2$ c) $x = -3$ and $y = 4$

9) Work out the value of $3x^2 + 4y$ when

a) $x = 1$ and $y = 5$ b) $x = -2$ and $y = 2$ c) $x = 3$ and $y = -2$

10) Using the formula $P = H \times R$, where $P$ is the total pay, $H$ is the number of hours worked, and $R$ is the hourly rate of pay.

Work out the total pay ($P$) of the following people:

a) Betty worked 10 hours at £7 per hour

b) John worked 15 hours and is paid £9 per hour

c) Mike worked for 90 minutes at £16 an hour.

11) The equation of a straight line is given as $y = 3x + 2$

a) Work out the value of $y$ when

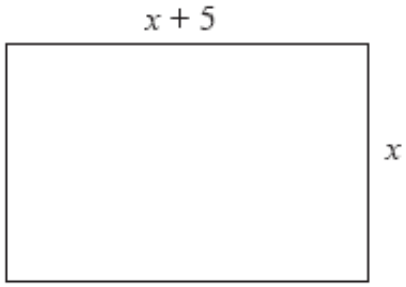
(i) $x = 0$

(ii) $x = 1$

(iii) $x = 2$

b) What is the value of $x$ when $y = 17$?

1) The width of a rectangle is $x$ centimetres.
The length of the rectangle is $(x + 5)$ centimetres.




a) Find an expression, in terms of $x$, for the perimeter of the rectangle.
Give your answer in its simplest form.

The perimeter of the rectangle is 38 centimetres.

b) Work out the length of the rectangle.

2)

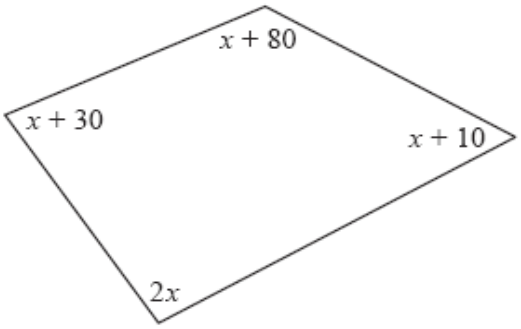



*Diagram **NOT** accurately drawn*

The sizes of the angles, in degrees, of the quadrilateral are

$x + 10$
$2x$
$x + 80$
$x + 30$

a) Use this information to write down an equation in terms of $x$.

b) Use your answer to part (a) to work out the size of the smallest angle of the quadrilateral.

3) Sarah buys 6 cups and 6 mugs
A cup costs £$x$
A mug costs £$(x + 3)$

a) Write down an expression, in terms of $x$, for the total cost, in pounds, of 6 cups and 6 mugs.

b) If the total cost of 6 cups and 6 mugs is £48, write an equation in terms of $x$.

c) Solve your equation to find the cost of a cup and the cost of a mug.

**Changing the subject of a formulae**
**(Mathswatch clip 107)**

**UNITS 5 - Homework 26H**

1) Make $c$ the subject of the formula.

$a = b + cd$

2) Make $t$ the subject of the formula.

$u = v + 2t$

3) Make $n$ the subject of the formula.

$M = 3n + 5$

4) Make $z$ the subject of the formula.

$x = 3y + z$

5) $r = 5s + 3t$

a) Make $t$ the subject of the formula.

b) Make $s$ the subject of the formula.

6) Rearrange $y = 3x + 1$ to make $x$ the subject.

7) Rearrange $y = \frac{1}{2}x + 2$ to make $x$ the subject.

8) Rearrange $y = \frac{1}{3}x + 1$ to make $x$ the subject.