

Year 10

Set 1

Summer Work 2018

GCSE Preparation

Name: _____

Due: Friday 7th September

Answer in your homework book.

Standard Form

Things to remember:

- $a \times 10^b$



$1 \leq a < 10$

1. A floppy disk can store 1 440 000 bytes of data.
(a) Write the number 1 440 000 in standard form.

.....
(1)

A hard disk can store 2.4×10^9 bytes of data.

- (b) Calculate the number of floppy disks needed to store the 2.4×10^9 bytes of data.

.....
(3)
(Total 4 marks)

2. A nanosecond is 0.000 000 001 second.
(a) Write the number 0.000 000 001 in standard form.

.....
(1)

A computer does a calculation in 5 nanoseconds.

- (b) How many of these calculations can the computer do in 1 second?
Give your answer in standard form.

.....
(2)
(Total 3 marks)

3. (a) (i) Write 40 000 000 in standard form.
(ii) Write 3×10^{-5} as an ordinary number.

.....
.....
(2)

- (b) Work out the value of
 $3 \times 10^{-5} \times 40\,000\,000$
Give your answer in standard form.

.....
(2)
(Total 4 marks)

4. Work out $(3.2 \times 10^5) \times (4.5 \times 10^4)$
Give your answer in standard form correct to 2 significant figures.

.....
(Total 2 marks)

5. (a) Write the number 40 000 000 in standard form.

.....
(1)

- (b) Write 1.4×10^{-5} as an ordinary number.

.....
(1)

- (c) Work out
 $(5 \times 10^4) \times (6 \times 10^9)$
Give your answer in standard form.

.....
(2)
(Total 4 marks)

6. Write in standard form

- (a) 456 000

.....
(1)

- (b) 0.00034

.....
(1)

- (c) 16×10^7

.....
(1)
(Total 3 marks)

7. (a) Write 5.7×10^{-4} as an ordinary number.

.....
(1)

- (b) Work out the value of $(7 \times 10^4) \times (3 \times 10^5)$
Give your answer in standard form.

.....
(2)
(Total 3 marks)

8. (a) Write 30 000 000 in standard form.

 (1)
- (b) Write 2×10^{-3} as an ordinary number.

 (1)
- (Total 2 marks)**

9. (a) (i) Write 7900 in standard form.

- (ii) Write 0.00035 in standard form.

- (2)**

- (b) Work out $\frac{4 \times 10^3}{8 \times 10^{-5}}$
 Give your answer in standard form.

- (2)**
- (Total 4 marks)**

10. Work out

$$\frac{2 \times 2.2 \times 10^{12} \times 1.5 \times 10^{12}}{2.2 \times 10^{12} - 1.5 \times 10^{12}}$$
 Give your answer in standard form correct to 3 significant figures.

.....
(Total 3 marks)

11. (a) Write 6.4×10^4 as an ordinary number.

 (1)
- (b) Write 0.0039 in standard form.

 (1)
- (c) Write 0.25×10^7 in standard form.

- (1)**
- (Total 3 marks)**

Laws of Indices

Things to remember:

$$a^m \times a^n = a^{m+n}$$

$$a^{-n} = \frac{1}{a^n}$$

$$a^m \div a^n = a^{m-n}$$

$$(a^m)^n = a^{mn}$$

$$a^0 = 1$$

$$a^{\frac{m}{n}} = \sqrt[n]{a^m}$$

Questions:

1. (a) Simplify $m^5 \div m^3$

.....
(1)

- (b) Simplify $5x^4y^3 \times x^2y$

.....
(2)

(Total for Question is 3 marks)

2. Write these numbers in order of size.
Start with the smallest number.

5^{-1}

0.5

-5

5^0

.....
(Total for Question is 2 marks)

3. Write down the value of $125^{\frac{2}{3}}$

.....
(Total for question is 1 mark)

4. (a) Write down the value of 10^{-1}

.....
(1)

- (b) Find the value of $27^{\frac{2}{3}}$

.....
(2)
(Total for Question is 3 marks)

5. (a) Find the value of 5^0
.....
(1)

(b) Find the value of $27^{1/3}$
.....
(1)

(c) Find the value of 2^{-3}
.....
(1)

(Total for Question is 3 marks)

6. (a) Write down the value of $27^{1/3}$
.....
(1)

(b) Find the value of $27^{-1/2}$
.....
(2)

(Total for Question is 3 marks)

7. (a) Write down the value of $64^{1/2}$
.....
(1)

(b) Find the value of $\left(\frac{8}{125}\right)^{-2/3}$
.....
(2)

(Total for question = 3 marks)

8. (a) Write down the value of 6^0
.....
(1)

(b) Work out $64^{2/3}$
.....
(2)

(Total for question = 3 marks)

Estimating Calculations

Things to remember:

- Round each number to one significant figure first (e.g. nearest whole number, nearest ten, nearest one decimal place) – this earns you one mark.
- Don't forget to use BIDMAS.

Questions:

1. Work out an estimate for $\frac{3.1 \times 9.87}{0.509}$

.....
(Total for Question is 3 marks)

2. Margaret has some goats.
The goats produce an average total of 21.7 litres of milk per day for 280 days.
Margaret sells the milk in $\frac{1}{2}$ litre bottles.
Work out an estimate for the total number of bottles that Margaret will be able to fill with the milk.
You must show clearly how you got your estimate.

.....
(Total for Question is 3 marks)

3. Work out an estimate for the value of $\frac{89.3 \times 0.51}{4.8}$

.....
(Total for Question is 2 marks)

4. Work out an estimate for $\sqrt{4.98 + 2.16 \times 7.35}$

.....
(Total for question = 3 marks)

5. A ticket for a seat at a school play costs £2.95
There are 21 rows of seats.
There are 39 seats in each row.
The school will sell all the tickets.
Work out an estimate for the total money the school will get.

£

(Total for Question is 3 marks)

6. Jayne writes down the following

$$3.4 \times 5.3 = 180.2$$

Without doing the exact calculation, explain why Jayne's answer cannot be correct.

.....
.....
.....

(Total for question is 1 mark)

Bounds

Things to remember:

- Calculating bounds is the opposite of rounding – they are the limits at which you would round up instead of down, and vice versa.

Questions:

1. A piece of wood has a length of 65 centimetres to the nearest centimetre.
(a) What is the least possible length of the piece of wood?

.....
(1)

- (b) What is the greatest possible length of the piece of wood?

.....
(1)

(Total for Question is 2 marks)

2. Chelsea's height is 168 cm to the nearest cm.
(a) What is Chelsea's minimum possible height?

..... cm
(1)

- (b) What is Chelsea's maximum possible height?

..... cm
(1)

(Total for Question is 2 marks)

3. Dionne has 60 golf balls.
Each of these golf balls weighs 42 grams to the nearest gram.
Work out the greatest possible total weight of all 60 golf balls.
Give your answer in kilograms.

..... kg
(Total for Question is 3 marks)

4. The length, L cm, of a line is measured as 13 cm correct to the nearest centimetre.
Complete the following statement to show the range of possible values of L

..... $\leq L <$
(Total for question is 2 marks)

5. Jim rounds a number, x , to one decimal place.
The result is 7.2
Write down the error interval for x .

.....
(Total for question = 2 marks)

6. A pencil has a length of 17 cm measured to the nearest centimetre.
(a) Write down the least possible length of the pencil.

.....
(1)

- (b) Write down the greatest possible length of the pencil.

.....
(1)

(Total for Question is 2 marks)

Expand and Factorise Quadratics

Things to remember:

- Use FOIL (first, outside, inside, last) or the grid method (for multiplication) to expand brackets.
- For any quadratic $ax^2 + bx + c = 0$, find a pair of numbers with a sum of b and a product of ac to factorise.

Questions:

1. Expand and simplify $(m + 7)(m + 3)$

.....
(Total for question = 2 marks)

2. (a) Factorise $6 + 9x$

.....
(1)

(b) Factorise $y^2 - 16$

.....
(1)

(c) Factorise $2p^2 - p - 10$

.....
(2)

(Total for Question is 4 marks)

3. Solve, by factorising, the equation $8x^2 - 30x - 27 = 0$

.....
(Total for Question is 3 marks)

4. Factorise $x^2 + 3x - 4$

.....
(Total for question is 2 marks)

5. Write $x^2 + 2x - 8$ in the form $(x + m)^2 + n$ where m and n are integers.

.....
(Total for question is 2 marks)

6. (a) Expand $4(3x + 5)$

.....
(1)

(b) Expand and simplify $2(x - 4) + 3(x + 5)$

.....
(2)

(c) Expand and simplify $(x + 4)(x + 6)$

.....
(2)

(Total for Question is 5 marks)

7. (a) Factorise $x^2 + 5x + 4$

.....
(2)

(b) Expand and simplify $(3x - 1)(2x + 5)$

.....
(2)

(Total for Question is 4 marks)

8. (a) Expand $3(2 + t)$ (1)
- (b) Expand $3x(2x + 5)$ (2)
- (c) Expand and simplify $(m + 3)(m + 10)$

..... (2)
(Total for Question is 5 marks)

9. (a) Factorise $x^2 + 7x$ (1)
- (b) Factorise $y^2 - 10y + 16$
- * (c) (i) Factorise $2t^2 + 5t + 2$ (2)

- (ii) t is a positive whole number.
 The expression $2t^2 + 5t + 2$ can never have a value that is a prime number.
 Explain why.

.....

.....

.....

..... (3)
(Total for Question is 6 marks)

Rearranging Formulae

Things to remember:

- Firstly decide what needs to be on its own.
- Secondly move all terms that contain that letter to one side. Remember to move all terms if it appears in more than one.
- Thirdly separate out the required letter on its own.

Questions:

7. Make u the subject of the formula

$$D = ut + kt^2$$

$$u = \dots\dots\dots$$

(Total 2 marks)

2. (a) Solve $4(x + 3) = 6$

$$x = \dots\dots\dots$$

(3)

(b) Make t the subject of the formula $v = u + 5t$

$$t = \dots\dots\dots$$

(2)
(Total 5 marks)

3. (a) Expand and simplify
 $(x - y)^2$

$$\dots\dots\dots$$

(2)

(b) Rearrange $a(q - c) = d$ to make q the subject.

$$Q = \dots\dots\dots$$

(3)
(Total 5 marks)

4. Make x the subject of
 $5(x - 3) = y(4 - 3x)$

$x = \dots\dots\dots$
(Total 4 marks)

5.
$$P = \frac{n^2 + a}{n + a}$$
Rearrange the formula to make a the subject.

$A = \dots\dots\dots$
(Total 4 marks)

6.
$$\frac{x}{x + c} = \frac{p}{q}$$
Make x the subject of the formula.

$X = \dots\dots\dots$
(Total 4 marks)

Linear Simultaneous Equations

Things to remember:

1. Scale up (if necessary)
2. Add or subtract (to eliminate)
3. Solve (to find x)
4. Substitute (to find y) (or the other way around)

Questions:

- *1. The Singh family and the Peterson family go to the cinema.
The Singh family buy 2 adult tickets and 3 child tickets.
They pay £28.20 for the tickets.
The Peterson family buy 3 adult tickets and 5 child tickets.
They pay £44.75 for the tickets.
Find the cost of each adult ticket and each child ticket.

(Total for question = 5 marks)

2. Solve the simultaneous equations

$$3x + 4y = 5$$

$$2x - 3y = 9$$

$$x = \dots\dots\dots$$

$$y = \dots\dots\dots$$

(Total for Question is 4 marks)

3. Solve the simultaneous equations

$$4x + 7y = 1$$

$$3x + 10y = 15$$

$x = \dots\dots\dots$

$y = \dots\dots\dots$

(Total for Question is 4 marks)

7. Solve

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

$$3x - 4y = 18$$

$x = \dots\dots\dots$

$y = \dots\dots\dots$

(Total for Question is 4 marks)

7. Solve the simultaneous equations

$$4x + y = 25$$

$$x - 3y = 16$$

$x = \dots\dots\dots$

$y = \dots\dots\dots$

(Total for Question is 3 marks)

7. Solve the simultaneous equations

$$3x - 2y = 7$$

$$7x + 2y = 13$$

$x = \dots\dots\dots$

$y = \dots\dots\dots$

(Total for Question is 3 marks)

7. A cinema sells adult tickets and child tickets.
The total cost of 3 adult tickets and 1 child ticket is £30
The total cost of 1 adult ticket and 3 child tickets is £22
Work out the cost of an adult ticket and the cost of a child ticket.

adult ticket £.....

child ticket £.....

(Total for question = 4 marks)

- *8. Paper clips are sold in small boxes and in large boxes.
There is a total of 1115 paper clips in 4 small boxes and 5 large boxes.
There is a total of 530 paper clips in 3 small boxes and 2 large boxes.
Work out the number of paper clips in each small box and in each large box.

(Total for Question is 5 marks)

Calculating with Fractions

Things to remember:

- If you have a mixed number, start by converting it to an improper fraction.
- Multiply fractions is easy – just multiply the numerators and multiply the denominators.
- To divide fractions, flip the second fraction upside-down and multiply instead.
- If you need to add or subtract fractions, you will need to start by finding equivalent fractions with a common denominator.
- Make sure you leave your answer in its simplest form.
- To convert a recurring decimal to a fraction you will need to multiply by 10^n , where n is the number of recurring digits. Then subtract the original number from the new one. Rearrange to find the fraction.

Questions:

1. (a) Work out $1\frac{3}{4} + 3\frac{1}{2}$

.....
(2)

(b) Work out $\frac{3}{7} \times \text{£}28$

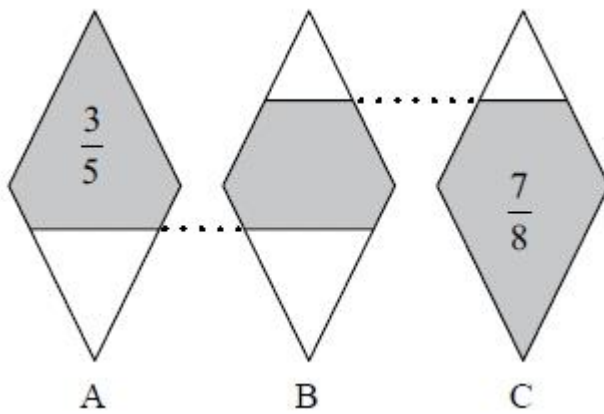
£.....
(2)

(Total for question = 4 marks)

2. Work out $3\frac{4}{5} + \frac{3}{7}$
Give your answer as a mixed number in its simplest form.

.....
(Total for question = 3 marks)

3. The diagram shows three identical shapes A, B and C.
 $\frac{3}{5}$ of shape A is shaded. $\frac{7}{8}$ of shape C is shaded.



What fraction of shape B is shaded?

(Total for question = 3 marks)

4. Express the recurring decimal $0.1\dot{5}$ as a fraction.
 Give your answer in its simplest form.

.....
(Total for Question is 3 marks)

5. Work out $3\frac{1}{3} \times 4\frac{2}{5}$
Give your answer as a mixed number in its simplest form.

.....
(Total for question = 3 marks)

6. Work out $\frac{3}{8} + \frac{1}{3}$

.....
(Total for Question is 2 marks)

7. Express the recurring decimal $0.7\dot{5}\dot{0}$ as a fraction.

.....
(Total for Question is 3 marks)

8. Express the recurring decimal $0.2\bar{8}1$ as a fraction in its simplest form.

.....
(Total for Question is 3 marks)

9. Work out $3\frac{1}{3} \div 4\frac{3}{4}$

.....
(Total for Question is 2 marks)

10. On a farm, $4\frac{1}{2}$ out of every 15 acres of the land are used to grow crops.
Wheat is grown on $\frac{5}{8}$ of the land used to grow crops.
What percentage of the total area of the land on the farm is used to grow wheat?

(Total for question = 3 marks)

Percentages – compound interest

Things to remember:

- New amount = original amount \times multiplier ^{n}

Number of years

Questions:

1. Henry invests £4500 at a compound interest rate of 5% per annum. At the end of n complete years the investment has grown to £5469.78. Find the value of n .

.....
(Total 2 marks)

2. Bill buys a new machine. The value of the machine depreciates by 20% each year.
(a) Bill says 'after 5 years the machine will have no value'. Bill is **wrong**. Explain why.

.....
.....
.....
(1)

Bill wants to work out the value of the machine after 2 years.

- (b) By what single decimal number should Bill multiply the value of the machine when new?

.....
(2)
(Total 3 marks)

3. Gwen bought a new car. Each year, the value of her car depreciated by 9%. Calculate the number of years after which the value of her car was 47% of its value when new.

.....
(Total 3 marks)

4. The value of a car depreciates by 35% each year. At the end of 2007 the value of the car was £5460. Work out the value of the car at the end of 2006

£
(Total 3 marks)

5. Toby invested £4500 for 2 years in a savings account.
He was paid 4% per annum compound interest.
(a) How much did Toby have in his savings account after 2 years?

£
(3)

- Jaspir invested £2400 for n years in a savings account.
He was paid 7.5% per annum compound interest.
At the end of the n years he had £3445.51 in the savings account.
(a) Work out the value of n .

.....
(2)
(Total 5 marks)

6. Mario invests £2000 for 3 years at 5% per annum **compound** interest.
Calculate the value of the investment at the end of 3 years.

£
(Total 3 marks)

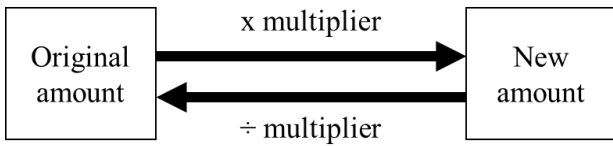
7. Toby invested £4500 for 2 years in a savings account.
He was paid 4% per annum compound interest.
How much did Toby have in his savings account after 2 years?

£
(Total 3 marks)

Percentages – reverse

Things to remember:

- Work out what the multiplier would have been;



Questions:

- Loft insulation reduces annual heating costs by 20%.
After he insulated his loft, Curtley’s annual heating cost was £520.
 Work out Curtley’s annual heating cost would have been, if he had not insulated his loft.

£
(Total 3 marks)

- In a sale, normal prices are reduced by 20%.

SALE
20% OFF

Andrew bought a saddle for his horse in the sale.
 The sale price of the saddle was £220.
 Calculate the normal price of the saddle.

£
(Total 3 marks)

- Hajra’s weekly pay this year is £240
 This is 20% more than her weekly pay last year.
 Bill says ‘This means Hajra’s weekly pay last year was £192’.
 Bill is wrong,

(a) Explain why.

.....

(1)

(b) Work out Hajra’s weekly pay last year.

£
(2)
(Total 3 marks)

4. The price of all rail season tickets to London increased by 4%.
(a) The price of a rail season ticket from Cambridge to London increased by £121.60
Work out the price before this increase.

£
(2)

- (b) After the increase, the price of a rail season ticket from Brighton to London was
£2828.80
Work out the price before this increase.

£
(3)
(Total 5 marks)

5. In a sale, normal prices are reduced by 25%.
The sale price of a saw is £12.75
Calculate the normal price of the saw.

£
(Total 3 marks)

6. In a sale, normal prices are reduced by 12%.
The sale price of a DVD player is £242.
Work out the normal price of the DVD player.

£
(Total 3 marks)

7. A garage sells cars.
It offers a discount of 20% off the normal price for cash.
Dave pays £5200 cash for a car.
Calculate the normal price of the car.

£
(Total 3 marks)

Useful websites:

www.mathswatchvle.com

(Video explanations and questions)

Centre ID: twgash

Username: firstname

Password: lastname

www.methodmaths.com

(Past papers online that get instantly marked)

Centre ID: wga

Username: firstname

Password: lastname

www.hegartymaths.com

(Online tutorials and quizzes)

Login: first name and last name are backwards and
case sensitive

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Remember: Do your best;
it is all you can do 😊