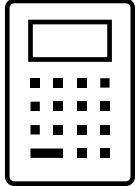


Surname:

Forename(s):

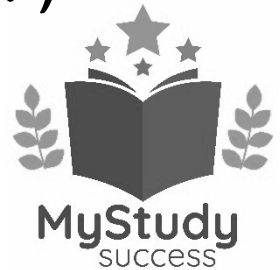
# GCSE Mathematics

## Prime Factorisation (LCM/HCF)



# ANSWERS

## Grade 4



These questions get more difficult as you go through this paper.

This topic could come up on a calculator paper and non-calculator paper.

### Materials

- **Formulae Sheet** (on the next page)
- **Black** ink or ball-point pen
- Pencil
- Eraser
- Protractor
- Compass
- Tracing Paper
- **Calculator allowed**

### Instructions

- Show **all** of your working.
- Draw diagrams in pencil.
- Plot graphs in pencil.
- Diagrams are **not** accurately drawn, unless otherwise indicated.

## Foundation Tier Formulae Sheet

### Perimeter, Area and Volume

Where  $a$  and  $b$  are the lengths of the parallel sides and  $h$  is their perpendicular separation:

**Area of a trapezium** =  $\frac{1}{2}(a + b)h$

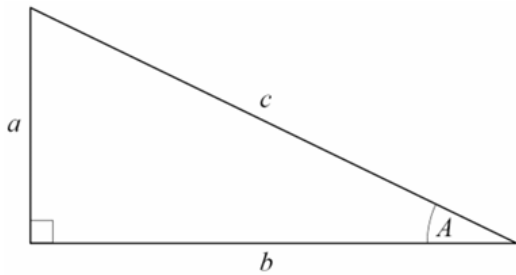
**Volume of a prism** = area of cross section  $\times$  length

Where  $r$  is the radius and  $d$  is the diameter:

**Circumference of a circle** =  $2\pi r = \pi d$

**Area of a circle** =  $\pi r^2$

### Pythagoras' Theorem and Trigonometry



In any right-angled triangle where  $a$ ,  $b$  and  $c$  are the length of the sides and  $c$  is the hypotenuse:

$$a^2 + b^2 = c^2$$

In any right-angled triangle  $ABC$  where  $a$ ,  $b$  and  $c$  are the length of the sides and  $c$  is the hypotenuse:

$$\sin A = \frac{a}{c} \quad \cos A = \frac{b}{c} \quad \tan A = \frac{a}{b}$$

### Compound Interest

Where  $P$  is the principal amount,  $r$  is the interest rate over a given period and  $n$  is number of times that the interest is compounded:

$$\text{Total accrued} = P \left( 1 + \frac{r}{100} \right)^n$$

### Probability

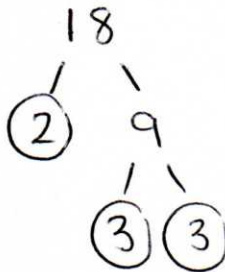
Where  $P(A)$  is the probability of outcome  $A$

and  $P(B)$  is the probability of outcome  $B$ :

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$P(A \text{ and } B) = P(A \text{ given } B) P(B)$$

- 1 Express 18 as a product of its prime factors.

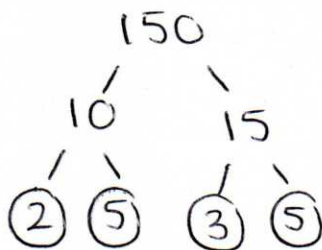


$$18 = 2 \times 3 \times 3$$

$$2 \times 3^2$$

(Total for question 1 is 2 marks)

- 2 Express 150 as a product of its prime factors.

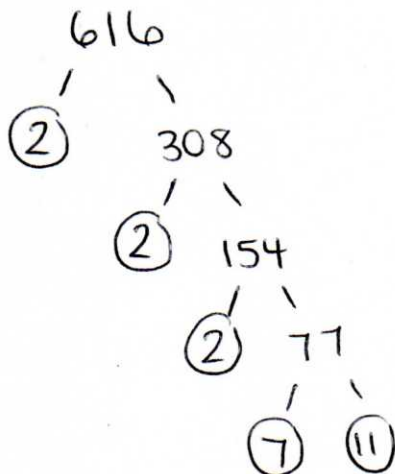


$$150 = 2 \times 3 \times 5 \times 5$$

$$2 \times 3 \times 5^2$$

(Total for question 2 is 2 marks)

- 3 Express 616 as a product of its prime factors.

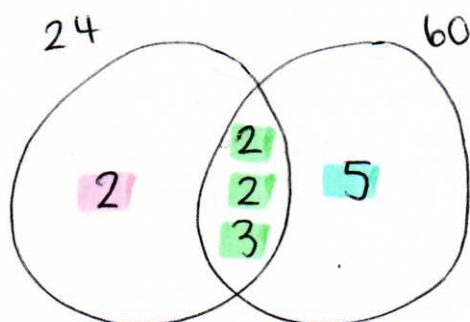
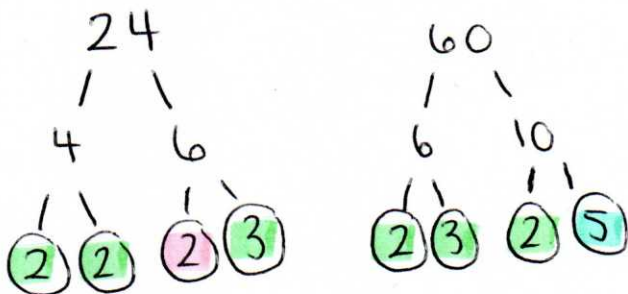


$$616 = 2 \times 2 \times 2 \times 7 \times 11$$

$$2^3 \times 7 \times 11$$

(Total for question 3 is 2 marks)

4 Find the highest common factor (HCF) of 24 and 60.

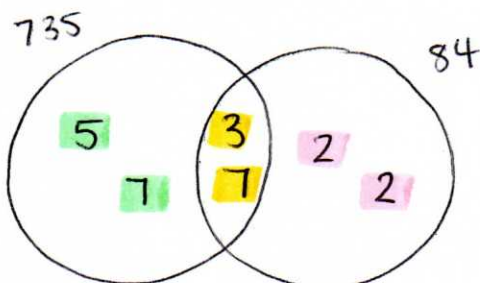
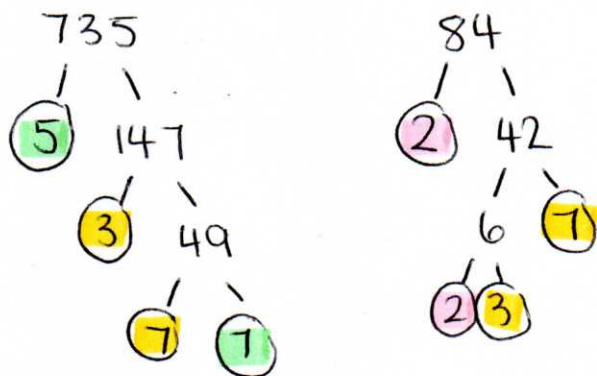


$$\text{HCF} = 2 \times 2 \times 3 = 12$$

12

(Total for question 4 is 3 marks)

5 Find the highest common factor (HCF) of 735 and 84

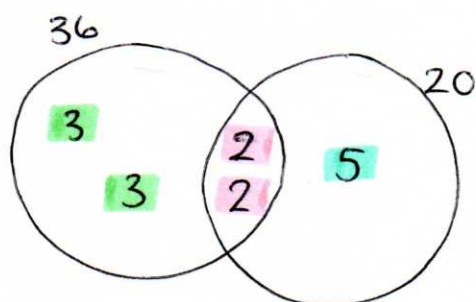
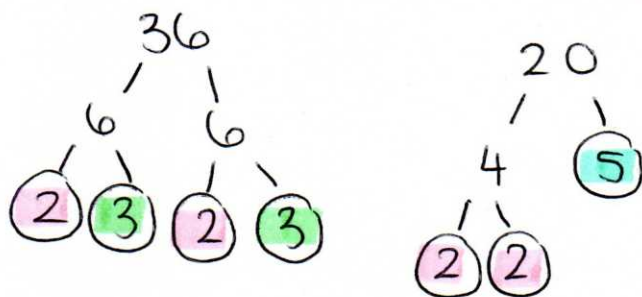


$$\text{HCF} = 3 \times 7 = 21$$

21

(Total for question 5 is 3marks)

6 Find the lowest common multiple (LCM) of 36 and 20

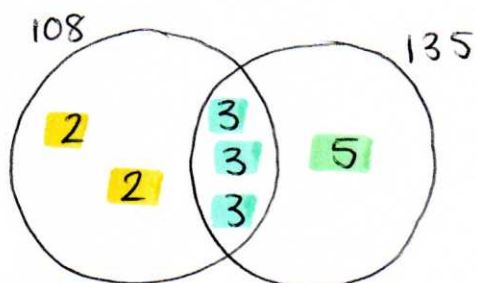
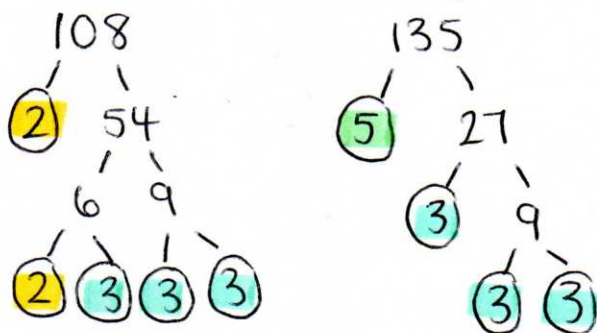


$$\text{LCM} = 3 \times 3 \times 2 \times 2 \times 5 = 180$$

180

(Total for question 6 is 3 marks)

7 Find the lowest common multiple (LCM) of 108 and 135

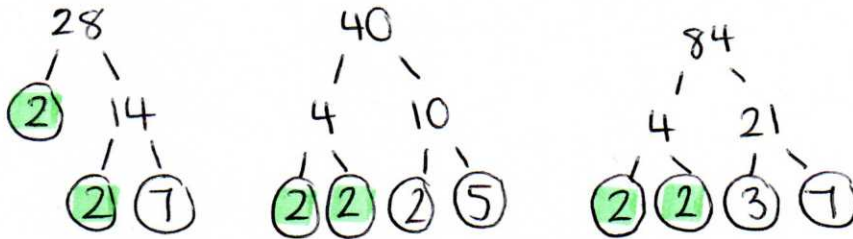


$$\text{LCM} = 2 \times 2 \times 3 \times 3 \times 3 \times 5 = 540$$

540

(Total for question 7 is 3 marks)

8 Find the highest common factor (HCF) of 28, 40, and 84.

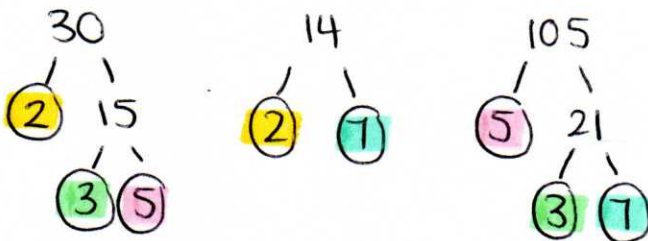


$$\text{HCF} = 2 \times 2 = 4$$

4

(Total for question 8 is 3 marks)

9 Find the lowest common multiple (LCM) of 30, 14 and 105



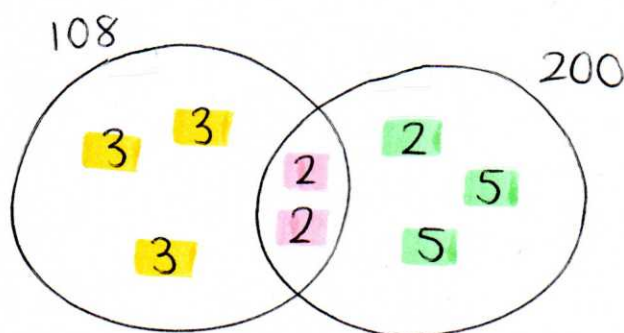
$$\text{LCM} = 2 \times 3 \times 5 \times 7 = 210$$

210

(Total for question 9 is 3 marks)

10  $108 = 2^2 \times 3^3$

$200 = 2^3 \times 5^2$



(a) Write down the highest common factor of 108 and 200

$HCF = 2 \times 2 = 4$

4

(1)

(b) Write down the lowest common multiple of 108 and 200

$LCM = 3 \times 3 \times 3 \times 2 \times 2 \times 2 \times 5 \times 5$   
 $= 5400$

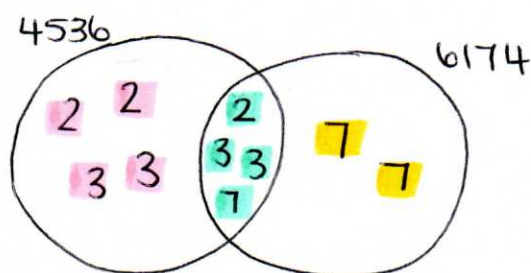
5400

(2)

(Total for question 10 is 3 marks)

11  $4536 = 2^3 \times 3^4 \times 7$

$6174 = 2 \times 3^2 \times 7^3$



(a) Write down the highest common factor of 4536 and 6174

$HCF = 2 \times 3 \times 3 \times 7 = 126$

126

(1)

(b) Write down the lowest common multiple of 4536 and 6174

$LCM = 2 \times 2 \times 3 \times 3 \times 2 \times 3 \times 3 \times 7 \times 7 \times 7$   
 $= 222264$

222264

(2)

(Total for question 11 is 3 marks)

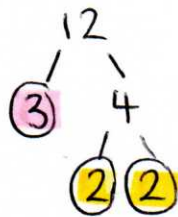
12 A blue light flashes every 15 seconds.

A red light flashes every 12 seconds.

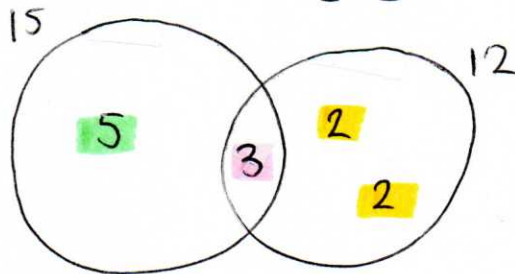
Both lights flash at the same time.

How long will it take until both lights flash at the same time again.

Give your answer in seconds.



$$\text{LCM} = 5 \times 3 \times 2 \times 2 = 60$$



60 seconds.

(Total for question 12 is 3 marks)

13 Three buses use the same bus stop.

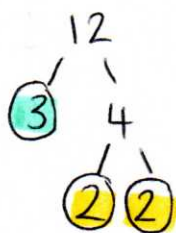
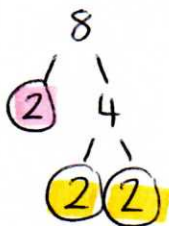
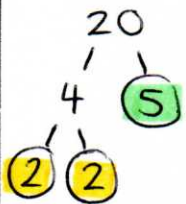
Bus A's route takes 20 minutes.

Bus B's route takes 8 minutes.

Bus C's route takes 12 minutes.

All three buses are at the bus stop at 9:15am.

What time will all three buses next be at the bus stop?



$$\begin{aligned} \text{LCM} &= 2 \times 2 \times 5 \times 2 \times 3 \\ &= 120 \text{ minutes} \\ &= 2 \text{ hours} \end{aligned}$$

11:15am

(Total for question 13 is 3 marks)