HCF AND LCM

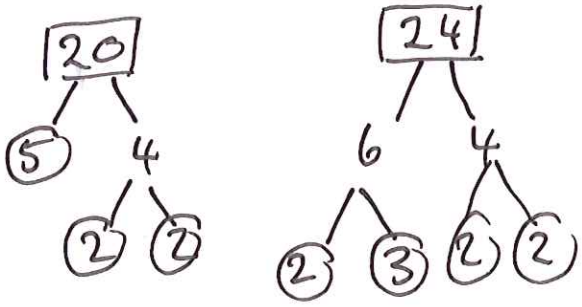
DATE OF SOLUTIONS: 15/05/2018
MAXIMUM MARK: 44

SOLUTIONS

GCSE (+ IGCSE) EXAM QUESTION PRACTICE

1. [Edexcel, 2014] HCF and LCM **[2 Marks]**

Find the Lowest Common Multiple (LCM) of 20 and 24



$20 = 2^2 \times 5$

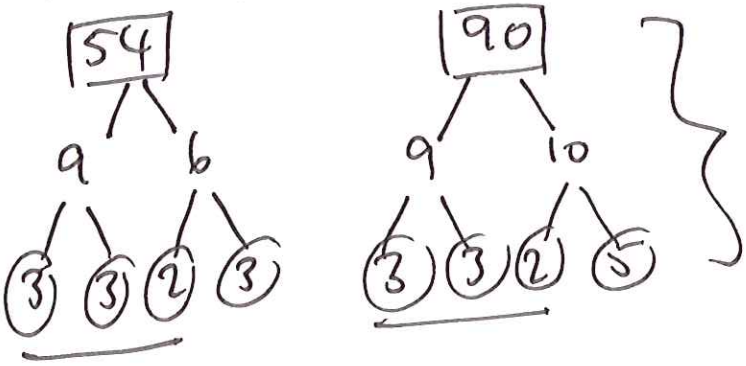
$24 = 2^3 \times 3$ } M1

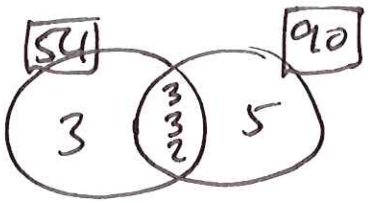
$= 2^3 \times 3 \times 5$

$= 120$ A1

2. [Edexcel, 2013] HCF and LCM **[4 Marks]**

(a) Find the Highest Common Factor (HCF) of 54 and 90





HCF = 3 × 3 × 2

M1

18 A1

(2)

(b) Find the Lowest Common Multiple (LCM) of 54 and 90

LCM = 3 × (3 × 3 × 2) × 5

M1

A1

270

(2)

3. [Edexcel, 2016] HCF and LCM **[2 Marks]**

The highest common factor (HCF) of 140 and x is 20

The lowest common multiple (LCM) of 140 and x is 420

Find the value of x.

FOR ANY TWO NUMBERS
$A \times B = HCF \times LCM$

$$140x = 20 \times 420 \quad \text{(M1)}$$

$$\Rightarrow x = \frac{20 \times 420}{140}$$

$$= \underline{\underline{60}} \quad \text{(A1)}$$

[LOTS OF OTHER METHODS ARE POSSIBLE!]

4. [New Question, by Maths4Everyone.com] HCF and LCM **[2 Marks]**

$S = 2^4 \times 3 \times 7^2$

$T = 2 \times 5^3 \times 7^3$

Find the Highest Common Factor (HCF) of S and T.

$S = 2^4 \times 3 \times 7^2$

$T = 2 \times 5^3 \times 7^3$

} PRIME FACTORS MATCHED UP

$2 \quad 7^2$ ⇐ COMMON FACTORS

$HCF = 2 \times 7^2$ (M1)

$= 98$ (A1)

5. [Edexcel, 2013] HCF and LCM **[2 Marks]**

$A = 2^3 \times 3^2 \times 5^4$ $= 2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 5 \times 5 \times 5$

$B = 3^5 \times 5 \times 7^3$ $= 3 \times 3 \times 3 \times 3 \times 3 \times 5 \times 7 \times 7 \times 7$

Find the Highest Common Factor (HCF) of A and B.

COMMON FACTORS ARE (MATCHING)

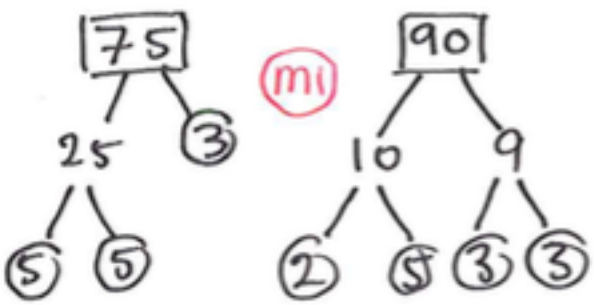
3, 3, 5 (M1)

∴ HCF = 3 × 3 × 5

45 (A1)

6. [Edexcel, 2012] HCF and LCM **[4 Marks]**

(a) Find the Highest Common Factor (HCF) of 75 and 90



M1

HCF = 3×5

15 A1

(2)

(b) Find the Lowest Common Multiple (LCM) of 75 and 90

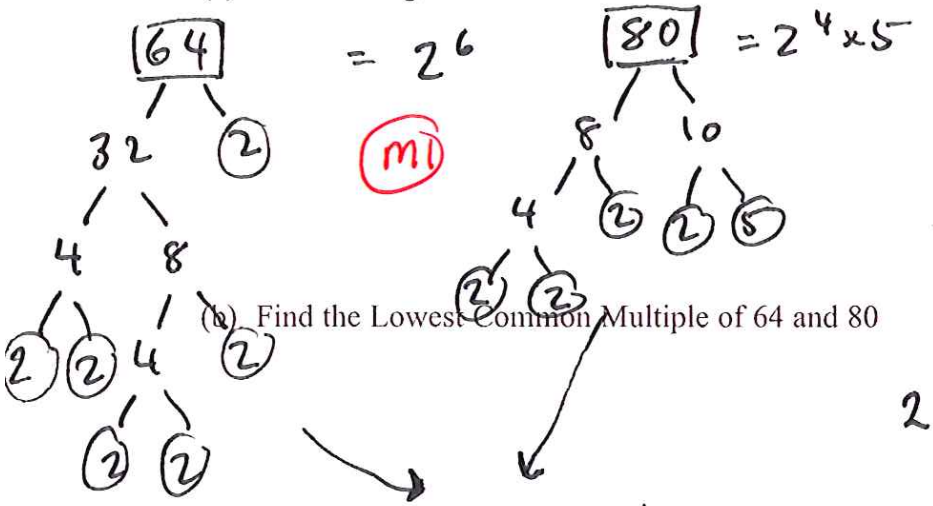
HCF × LCM = A × B

$\Rightarrow LCM = \frac{75 \times 90}{15}$ M1

450 A1

(2)

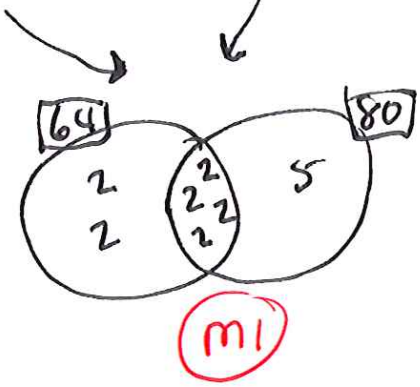
(a) Find the Highest Common Factor of 64 and 80



$2^4 = 16$ A1

(2)

(b) Find the Lowest Common Multiple of 64 and 80



$2 \times 2 \times (2 \times 2 \times 2 \times 2) \times 5$

320 A1

(2)

8. [Edexcel, 2015] HCF and LCM **[2 Marks]**

x is an integer.
The Lowest Common Multiple (LCM) of x and 12 is 120
The Highest Common Factor (HCF) of x and 12 is 4

Work out the value of x.

HCF × LCM = A × B

$$12 \times x = \text{HCF} \times \text{LCM}$$

$$\Rightarrow 12x = 4 \times 120 \quad \text{(M1)}$$

$$12x = 480$$

$$x = \frac{480}{12}$$

$$= \underline{40} \quad \text{(A1)}$$

Given that $A = 2^3 \times 3$ and $B = 2^2 \times 3^2$

find the Lowest Common Multiple (LCM) of A and B.

$$HCF = 2^2 \times 3$$

$$\therefore \text{LCM} = \frac{2^3 \times 3 \times 2^2 \times 3^2}{2^2 \times 3}$$ (M1) [FOR ANY USEFUL METHOD]

$$= 2^3 \times 3^2$$ R

$$= 72$$ (A1) EITHER

10. [New Question, by Maths4Everyone.com] HCF and LCM **[4 Marks]**

$$A = 2^4 \times 3^2 \times 7^3$$

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

(a) Find the highest common factor (HCF) of A and B

$2^4 \times 3^2 \times 7^3$

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

LOWEST POWERS $2^2 \times 3^2$ (m1) → (HCF)

HIGHEST POWERS $2^4 \times 3^5 \times 5^2 \times 7^3$ (LCM) (m1)

36 (A1)

(2)

(b) Find the lowest common multiple (LCM) of A and B

33 339 600 (A1)

(2)

11. [Edexcel, 2015] HCF and LCM **[4 Marks]**

$3780 = 2^2 \times 3^3 \times 5 \times 7$	$3240 = 2^3 \times 3^4 \times 5$

(a) Find the highest common factor (HCF) of 3780 and 3240
Give your answer as a product of prime factors.

COMMON PRIME FACTORS :-

$3780 = 2^2 \times 3^3 \times 5 \times 7$

$3240 = 2^3 \times 3^4 \times 5$

[SMALLEST POWERS] $2^2 \times 3^3 \times 5$ → HCF

[LARGEST POWERS] $2^3 \times 3^4 \times 5 \times 7$

I LIKE THIS METHOD!

HCF = 540 (A2)

(2)

(b) Find the lowest common multiple (LCM) of 3780 and 3240
Give your answer as a product of prime factors.

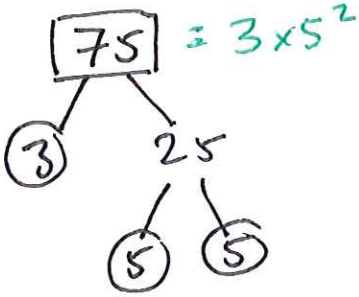
$3780 \times 3240 = HCF \times LCM$

$LCM = \frac{3780 \times 3240}{HCF}$

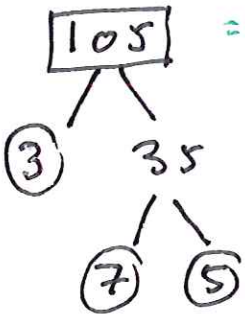
$= \frac{3780 \times 3240}{540} = 22680$ (A2)

12. [Edexcel, 2004] HCF and LCM **[4 Marks]**

(a) Find the Highest Common Factor of 75 and 105.



$= 3 \times 5^2$



$= 3 \times 5 \times 7$

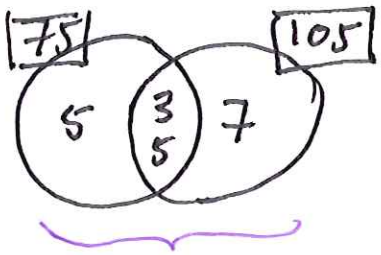
M1

HCF = 3×5

$= 15$ A1

(2)

(b) Find the Lowest Common Multiple of 75 and 105.



LCM = $5 \times (3 \times 5) \times 7$ M1

$= 525$ A1

13. [New Question, by Maths4Everyone.com] HCF and LCM **[4 Marks]**

$267\,300 = 2^2 \times 3^5 \times 5^2 \times 11$ $\times 7^0$!

$246\,960 = 2^4 \times 3^2 \times 5 \times 7^3$ $\times 11^0$!

(a) Find the highest common factor (HCF) of 267 300 and 246 960
Give your answer as a product of prime factors.

LOWEST OF EACH POWER $= 2^2 \times 3^2 \times 5 \times 7^0 \times 11^0$

A2

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

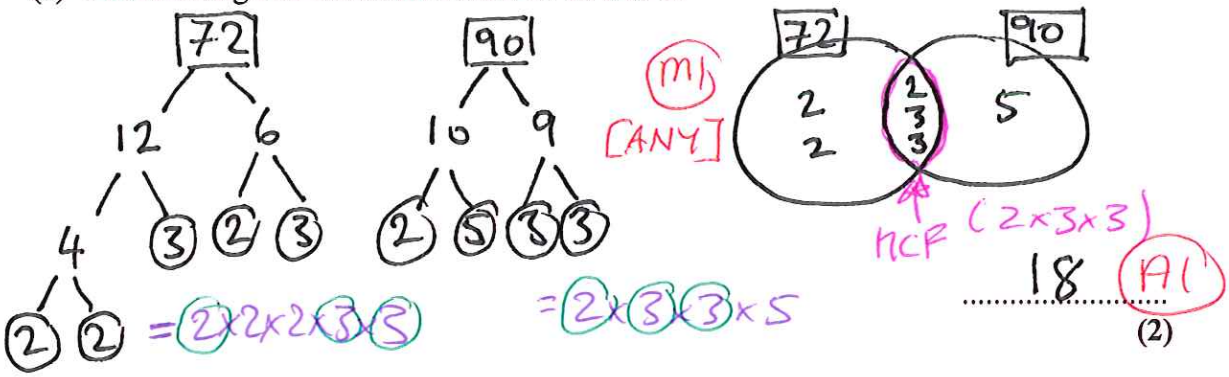
(2)

(b) Find the lowest common multiple (LCM) of 267 300 and 246 960
Give your answer as a product of prime factors.

HIGHEST OF EACH POWER $= 2^4 \times 3^5 \times 5^2 \times 7^3 \times 11$ A2

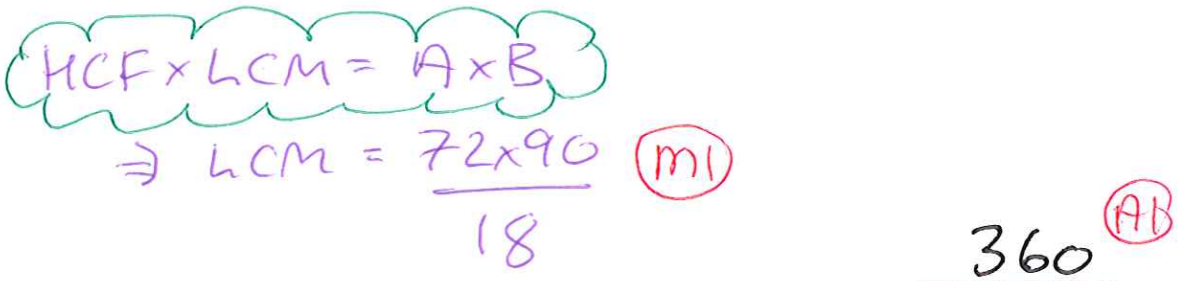
14. [Edexcel, 2007] HCF and LCM **[4 Marks]**

(a) Find the Highest Common Factor of 72 and 90



(2)

(b) Find the Lowest Common Multiple of 72 and 90



(2)

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The methods used in these solutions, where relevant, are methods which have been successfully used with students. The method shown for a particular question is not always the only method and there is no claim that the method that is used is necessarily the most efficient or 'best' method. From time to time, a solution to a question might be updated to show a different method if it is judged that it is a good idea to do so.

Sometimes a method used in these solutions might be unfamiliar to You. If You are able to use a different method to obtain the correct answer then You should consider to keep using your existing method and not change to the method that is used here. However, the choice of method is always up to You and it is often useful if You know more than one method to solve a particular type of problem.

Within these solutions there is an indication of where marks **might** be awarded for each question. B marks, M marks and A marks have been used in a similar, but **not identical**, way that an exam board uses these marks within their mark schemes. This slight difference in the use of these marking symbols has been done for simplicity and convenience. Sometimes B marks, M marks and A marks have been interchanged, when compared to an examiners' mark scheme and sometimes the marks have been awarded for different aspects of a solution when compared to an examiners' mark scheme.

B1 – This is an unconditional accuracy mark (the specific number, word or phrase must be seen. This type of mark cannot be given as a result of 'follow through').

M1 – This is a method mark. Method marks have been shown in places where they might be awarded for the method that is shown. If You use a different method to get a correct answer, then the same number of method marks would be awarded but it is not practical to show all possible methods, and the way in which marks might be awarded for their use, within these particular solutions. When appropriate, You should seek clarity and download the relevant examiner mark scheme from the exam board's web site.

A1 – These are accuracy marks. Accuracy marks are typically awarded after method marks. If the correct answer is obtained, then You should normally (but not always) expect to be awarded all of the method marks (provided that You have shown a method) and all of the accuracy marks.

Note that some questions contain the words 'show that', 'show your working out', or similar. These questions require working out to be shown. Failure to show sufficient working out is likely to result in no marks being awarded, even if the final answer is correct.

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