

Name: _____

Exam Style Questions
Product of Primes
LCM and HCF



Corbettmaths

Equipment needed: Pen and Calculator

Guidance

1. Read each question carefully before you begin answering it.
2. Check your answers seem right.
3. Always show your workings

Video Tutorial

www.corbettmaths.com/contents



Videos 223, 224

Answers and Video Solutions



1. Express 36 as a product of its prime factors.



$$\begin{array}{c} 36 \\ (2) \backslash 18 \\ (2) \backslash 9 \\ (3) \backslash (3) \end{array}$$

or

$$\begin{array}{r} 2 \overline{) 36} \\ 2 \overline{) 18} \\ 3 \overline{) 9} \\ 3 \overline{) 3} \\ \hline 1 \end{array}$$

$$2 \times 2 \times 3 \times 3$$

or

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

(2)

2. Express 100 as a product of its prime factors.



$$\begin{array}{c} 100 \\ (2) \backslash 50 \\ (2) \backslash 25 \\ (5) \backslash (5) \end{array}$$

or

$$\begin{array}{r} 2 \overline{) 100} \\ 2 \overline{) 50} \\ 5 \overline{) 25} \\ 5 \overline{) 5} \\ \hline 1 \end{array}$$

$$2 \times 2 \times 5 \times 5$$

or

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

(2)

3. Write 42 as a product of its prime factors.



$$\begin{array}{c} 42 \\ (2) \backslash 21 \\ (3) \backslash (7) \end{array}$$

or

$$\begin{array}{r} 2 \overline{) 42} \\ 3 \overline{) 21} \\ 7 \overline{) 7} \\ \hline 1 \end{array}$$

$$2 \times 3 \times 7$$

(2)

4. Write 24 as the product of its prime factors.
Give your answer in index form.



$$\begin{array}{r} 24 \\ \swarrow 2 \quad \searrow 12 \\ \swarrow 2 \quad \searrow 6 \\ \swarrow 2 \quad \searrow 3 \end{array}$$

$$\begin{array}{r} 2 \overline{) 24} \\ 2 \overline{) 12} \\ 2 \overline{) 6} \\ 3 \overline{) 3} \\ \end{array}$$

$$2 \times 2 \times 2 \times 3$$

$$2^3 \times 3$$

(3)

5. Write 360 as a product of its prime factors.



$$\begin{array}{r} 360 \\ \swarrow 10 \quad \searrow 36 \\ \swarrow 2 \quad \swarrow 5 \quad \swarrow 4 \quad \swarrow 9 \\ \swarrow 2 \quad \swarrow 2 \quad \swarrow 3 \quad \swarrow 3 \end{array}$$

$$\begin{array}{r} 2 \overline{) 360} \\ 2 \overline{) 180} \\ 2 \overline{) 90} \\ 3 \overline{) 45} \\ 3 \overline{) 15} \\ 5 \overline{) 5} \\ \end{array}$$

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

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

(2)

6. Write 5760 as a product of prime factors.



Give your answer in index form.

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

(2)

7. A number is written as a product of its prime factors as $2 \times 3^2 \times 5$



Work out the number.

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

$$2 \times 9 \times 5 = 90$$

90

(2)

8. Given that $18000 = 2^a \times 3^b \times 5^c$



Find the values of a, b and c.

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

$$a = \dots \quad 4$$

$$b = \dots \quad 2$$

$$c = \dots \quad 3$$

(2)

9. $3x^2 = 75$



(a) Find the value of x.

$$x^2 = 25$$

$$x = 5$$

$$\begin{array}{r} 75 \\ \overline{)3 \mid 25} \\ 25 \\ \overline{)5 \mid 5} \\ 5 \end{array}$$

5

(2)

(b) Express 75 as a product of its prime factors.

$$75 = 3 \times 5 \times 5$$

$$3 \times 5 \times 5$$

or

$$3 \times 5^2$$

(2)

10. You are given that $3x^3 = 375$
Find the value of x.



$$3x^3 = 375$$

or

$$x^3 = 125$$

$$x = 5$$

$$\begin{array}{r} 375 \\ (3)\overbrace{125}^{\wedge} \\ (5)\overbrace{25}^{\wedge} \\ \hline (5)\overbrace{5}^{\wedge} \end{array}$$

or

$$\begin{array}{r} 375 \\ 5 \overline{)125} \\ 5 \overline{)25} \\ 5 \overline{)5} \\ \hline 1 \end{array}$$

$$x = 5$$

(2)

11. You are given that $m = 2^3 \times 5$



(a) Work out $10m$

$$\begin{aligned} m &= 8 \times 5 \\ &= 40 \end{aligned}$$

$$10m = 400$$

$$400$$

(2)

(b) Write $10m$ as a product of primes

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

$$10m = 2^3 \times 5 \times 2 \times 5$$

$$10m = 2^4 \times 5^2$$

$$2^4 \times 5^2$$

(2)

12. $y = 3^2 \times 5^4$



Write $50y$ as a product of prime factors in index form.

$$\begin{array}{c} 50 \\ \swarrow \quad \searrow \\ (2) \quad 25 \\ \swarrow \quad \searrow \\ (5) \quad (5) \end{array}$$

$$\begin{aligned} y &= 3^2 \times 5^4 \\ 50y &= 3^2 \times 5^4 \times 2 \times 5^2 \\ &= 2 \times 5^6 \times 3^2 \\ &= 2 \times 3^2 \times 5^6 \end{aligned}$$

$$2 \times 3^2 \times 5^6$$

.....
(2)

13. (a) Write 48 as a product of its prime factors.



$$\begin{array}{c} 24 \\ \swarrow \quad \searrow \\ (2) \quad 12 \\ \swarrow \quad \searrow \\ (2) \quad 6 \\ \swarrow \quad \searrow \\ (2) \quad (3) \end{array}$$

$$\begin{array}{r} 2 \mid 48 \\ 2 \mid 24 \\ 2 \mid 12 \\ 2 \mid 6 \\ 3 \mid 3 \\ 1 \end{array}$$

$$2 \times 2 \times 2 \times 2 \times 3$$

$$2^4 \times 3$$

.....
(2)

(b) Find the Highest Common Factor (HCF) of 48 and 56.

$$\begin{array}{c} 56 \\ \swarrow \quad \searrow \\ (2) \quad 28 \\ \swarrow \quad \searrow \\ (2) \quad 14 \\ \swarrow \quad \searrow \\ (2) \quad 7 \end{array}$$

$$\begin{array}{r} 2 \mid 56 \\ 2 \mid 28 \\ 2 \mid 14 \\ 7 \mid 7 \\ 1 \end{array}$$

$$\begin{array}{ccc} 48 & & 56 \\ \bigcirc & \bigcirc & \bigcirc \\ 2 & 2 & 7 \\ 3 & 2 & \\ 1 & 1 & \end{array}$$

$$HCF = 2 \times 2 \times 2 = 8$$

$$2 \times 2 \times 2 \times 7$$

.....
8

.....
(2)

14. (a) Write 60 as a product of its prime factors.



$$\begin{array}{c}
 30 \\
 \textcircled{2} \textcircled{15} \\
 \textcircled{3} \textcircled{5}
 \end{array}
 \quad \text{or}
 \quad
 \begin{array}{c}
 60 \\
 2 \textcircled{30} \\
 3 \textcircled{15} \\
 5 \textcircled{1}
 \end{array}$$

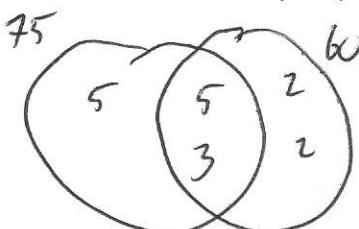
$$2 \times 2 \times 3 \times 5$$

$$\text{or} \quad 2^2 \times 3 \times 5$$

(2)

(b) Find the Lowest Common Multiple (LCM) of 60 and 75.

$$\begin{array}{c}
 75 \\
 \textcircled{3} \textcircled{25} \\
 \textcircled{5} \textcircled{5}
 \end{array}
 \quad 3 \times 5 \times 5$$



$$\begin{aligned}
 \text{LCM} &= 2 \times 2 \times 3 \times 5 \times 5 \\
 &= 300
 \end{aligned}$$

300

(2)

15. (a) Write 132 as a product of its prime factors.



$$\begin{array}{c}
 66 \\
 \textcircled{2} \textcircled{33} \\
 \textcircled{3} \textcircled{11}
 \end{array}
 \quad 2 \times 2 \times 3 \times 11$$

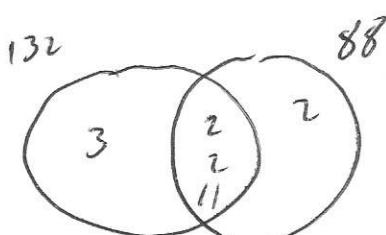
$$2 \times 2 \times 3 \times 11$$

$$\text{or} \quad 2^2 \times 3 \times 11$$

(2)

(b) Find the Highest Common Factor (HCF) of 88 and 132.

$$\begin{array}{c}
 88 \\
 \textcircled{2} \textcircled{44} \\
 \textcircled{2} \textcircled{22} \\
 \textcircled{2} \textcircled{11}
 \end{array}
 \quad 2 \times 2 \times 2 \times 11$$



$$\begin{aligned}
 \text{HCF} &: 2 \times 2 \times 11 \\
 &= 44
 \end{aligned}$$

44

(2)

16. Find the lowest common multiple (LCM) of 28 and 63.

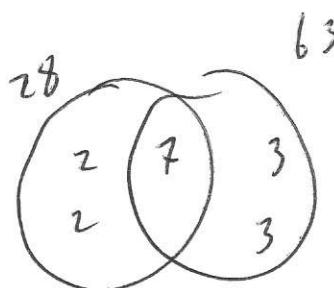


$$\begin{array}{c}
 28 \\
 \bigcirc 2 \bigg) 14 \\
 \bigcirc 2 \bigg) 7
 \end{array}$$

$$28 = 2 \times 2 \times 7$$

$$\begin{array}{c}
 63 \\
 \bigcirc 7 \bigg) 9 \\
 \bigcirc 3 \bigg) 3
 \end{array}$$

$$63 = 3 \times 3 \times 7$$



$$\begin{aligned}
 \text{LCM} &= 2 \times 2 \times 7 \times 3 \times 3 \\
 &= 252
 \end{aligned}$$

$$252$$

(2)

17. Find the lowest common multiple (LCM) of 36 and 54.

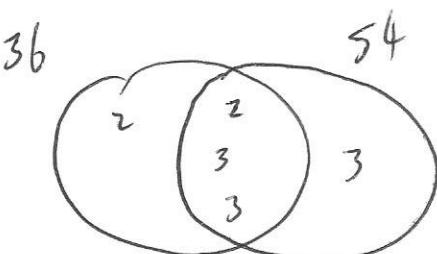


$$\begin{array}{c}
 36 \\
 \bigcirc 2 \bigg) 18 \\
 \bigcirc 2 \bigg) 9 \\
 \bigcirc 3 \bigg) 3
 \end{array}$$

$$2 \times 2 \times 3 \times 3$$

$$\begin{array}{c}
 54 \\
 \bigcirc 2 \bigg) 27 \\
 \bigcirc 3 \bigg) 9 \\
 \bigcirc 3 \bigg) 3
 \end{array}$$

$$2 \times 3 \times 3 \times 3$$



$$\begin{aligned}
 \text{LCM} &= 2 \times 2 \times 3 \times 3 \times 3 \\
 &= 108
 \end{aligned}$$

$$108$$

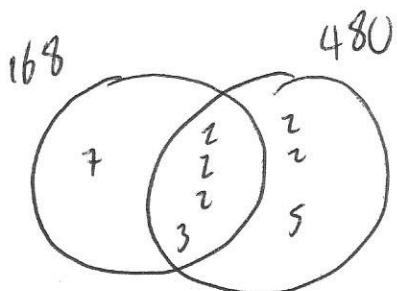
(2)

$$18. \quad 480 = 2^5 \times 3 \times 5$$



Find the highest common factor (HCF) of 480 and 168

$$168 = 2^3 \times 3 \times 7$$



$$2 \times 2 \times 2 \times 3 = 24$$

24

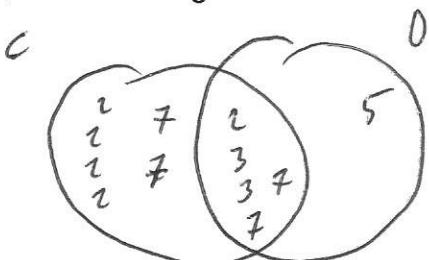
(3)

$$19. \quad C = 2^5 \times 3^2 \times 7^4$$

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



(a) Find the highest common factor (HCF) of C and D.



$$MCF = 892$$

882

(2)

(b) Find the lowest common multiple (LCM) of C and D.

$$Lcm = 345 + 440$$

3457440

(2)

20. You are given that $45 = 3^2 \times 5$



(a) Write each of the following as the product of prime factors in index form.

(i) 90

$$45 \times 2$$

$$(3^2 \times 5) \times 2$$

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

.....
(1)

(ii) 135

$$45 \times 3$$

$$(3^2 \times 5) \times 3$$

$$3^3 \times 5$$

.....
(1)

(iii) 450

$$45 \times 10$$

$$(3^2 \times 5) \times (2 \times 5)$$

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

.....
(1)

(b) What is the lowest common multiple (LCM) of 36 and 45.

$$\begin{array}{c} 36 \\ \diagdown 2 \\ 18 \\ \diagdown 2 \\ 9 \\ \diagdown 3 \\ 3 \end{array}$$

$$\begin{array}{c} 45 = 3 \times 3 \times 5 \\ \diagup 3 \\ 15 \\ \diagup 3 \\ 5 \end{array}$$

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

$$180$$

.....
(2)

(c) What is the highest common factor (HCF) of 36 and 45.

$$3 \times 3$$

$$9$$

.....
(2)

21. (a) Express 108 as a product of its prime factors.
Give your answer in index form.



$$\begin{array}{c}
 108 \\
 \swarrow 2 \quad \searrow 2 \\
 54 \\
 \swarrow 2 \quad \searrow 2 \\
 27 \\
 \swarrow 3 \quad \searrow 3 \\
 9 \\
 \swarrow 3 \quad \searrow 3
 \end{array}$$

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

(3)

(b) Find the Highest Common Factor (HCF) of 108 and 72.

$$\begin{array}{c}
 72 \\
 \swarrow 2 \quad \searrow 2 \\
 36 \\
 \swarrow 2 \quad \searrow 2 \\
 18 \\
 \swarrow 3 \quad \searrow 3 \\
 6 \\
 \swarrow 2 \quad \searrow 2 \\
 3
 \end{array}$$

$$\begin{array}{c}
 108 \\
 \swarrow 3 \quad \searrow 2 \\
 36 \\
 \swarrow 2 \quad \searrow 2 \\
 18 \\
 \swarrow 3 \quad \searrow 3 \\
 6 \\
 \swarrow 2 \quad \searrow 2 \\
 3
 \end{array}$$

$$72$$

$$\begin{aligned}
 HCF &= 2 \times 2 \times 3 \times 3 \\
 &= 36
 \end{aligned}$$

$$36$$

(2)

22. Find the Lowest Common Multiple (LCM) of 140 and 200



$$\begin{array}{c}
 140 \\
 \swarrow 2 \quad \searrow 2 \\
 70 \\
 \swarrow 2 \quad \searrow 2 \\
 35 \\
 \swarrow 5 \quad \searrow 5 \\
 7
 \end{array}$$

$$2 \times 2 \times 5 \times 7$$

$$\begin{array}{c}
 200 \\
 \swarrow 2 \quad \searrow 2 \\
 100 \\
 \swarrow 2 \quad \searrow 2 \\
 50 \\
 \swarrow 5 \quad \searrow 5 \\
 25 \\
 \swarrow 5 \quad \searrow 5 \\
 5
 \end{array}$$

$$2 \times 2 \times 2 \times 5 \times 5$$

$$\begin{array}{c}
 140 \\
 \swarrow 7 \quad \searrow 2 \\
 200 \\
 \swarrow 2 \quad \searrow 5 \\
 10 \\
 \swarrow 5 \quad \searrow 5 \\
 2
 \end{array}$$

$$LCM: 1400$$

$$1400$$

(3)

23. (a) Work out 6×12 as the product of prime factors.
Give your answer in index form.

Give your answer in
 6×12
 $(1) (3) (1) 6$
 $(2) (3)$

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

(3)

(b) Find the Highest Common Factor (HCF) of y and $5y$.

4

(1)

24. (a) Write 1008 as a product of prime factors.
Express your answer in index form.

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

(2)

(b) Hence find the **lowest** whole number by which 1008 would need to be multiplied by to give a square number.

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

$$2^4 \times 3^2 \times 7^2 = 7056$$

$$\sqrt{7056} = 84$$

7

(1)

25. Find the lowest common multiple of 19 and 34.



19 (prime)

19

34

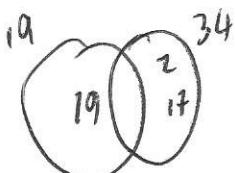
17
17

2×17

38

$$\begin{array}{r} \times 17 \\ \hline 266 \end{array}$$

$$\begin{array}{r} + 380 \\ \hline 646 \end{array}$$



$$2 \times 19 \times 17$$

$$38 \times 17$$

$$646$$

(2)

26. $16200 = 2^3 \times 3^4 \times 5^2$



Write down the lowest whole number by which 16200 needs to be multiplied by to make a **cube** number.

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

$$\times 3^2 \downarrow \quad \downarrow \times 5$$

$$3^2 \times 5 = 45$$

$$2^3 \times 3^6 \times 5^3$$

$$45$$

(2)

27. $4116 = 2^2 \times 3 \times 7^3$



Write down the lowest integer by which 4116 needs to be multiplied by to make a **square** number.

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

$$\times 3 \downarrow \quad \downarrow \times 7$$

$$3 \times 7 = 21$$

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

$$21$$

(2)

28. (a) Write 576 as a product of primes.



$$\begin{array}{r} 576 \\ \swarrow 2 \\ 288 \\ \swarrow 2 \\ 144 \\ \swarrow 2 \\ 72 \\ \swarrow 2 \\ 36 \\ \swarrow 2 \\ 18 \\ \swarrow 2 \\ 9 \\ \swarrow 3 \\ 3 \end{array}$$

$$2^6 \times 3^2$$

(2)

(b) Hence find $\sqrt{576}$

$$\begin{array}{c} 2 \\ 2 \\ 2 \\ 3 \end{array} \times \begin{array}{c} 2 \\ 2 \\ 3 \end{array}$$

$$2 \times 2 \times 2 \times 3 = 24$$

$$24$$

(2)

29. (a) Write 1728 as a product of primes.



$$\begin{array}{r} 1728 \\ \swarrow 2 \\ 864 \\ \swarrow 2 \\ 432 \\ \swarrow 2 \\ 216 \\ \swarrow 2 \\ 108 \\ \swarrow 2 \\ 54 \\ \swarrow 2 \\ 27 \\ \swarrow 3 \\ 9 \\ \swarrow 3 \\ 3 \end{array}$$

$$2^6 \times 3^3$$

(2)

(b) Hence find $\sqrt[3]{1728}$

$$\begin{array}{c} 2 \\ 2 \\ 3 \end{array} \times \begin{array}{c} 2 \\ 2 \\ 3 \end{array} \times \begin{array}{c} 2 \\ 2 \\ 3 \end{array}$$

$$2 \times 2 \times 3 = 12$$

$$12$$

(2)

30. $A = 3^3 \times c$

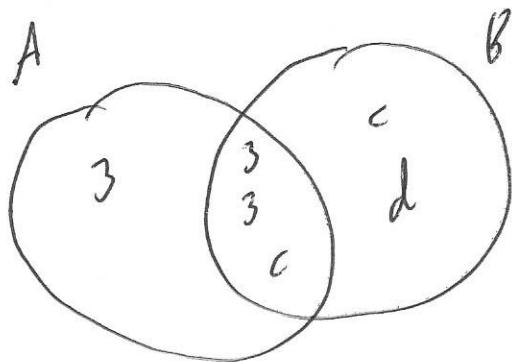


$$B = 3^2 \times c^2 \times d$$

The highest common factor (HCF) of A and B is 99

The lowest common multiple (LCM) of A and B is 16335

Find B.



$$3 \times 3 \times c = 99$$

$$9c = 99$$

$$c = 11$$

$$3 \times 3 \times 3 \times 11 \times 11 \times d = 16335$$

$$d = 5$$

5445

.....
(4)

$$\begin{aligned} B &= 3 \times 3 \times 11 \times 11 \times 5 \\ &= 5445 \end{aligned}$$