4.3 Prime Factors, HCF and LCM: 1-hour Pack

EDEXCEL 1MA1 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

Prime Factors, HCF and LCM: Fluency and Exam Drill

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This drill pack builds fluency in writing numbers as a product of their prime factors, and in using prime factorisation to find the highest common factor (HCF) and lowest common multiple (LCM) of two or more numbers. It then moves into exam-style problem-solving questions, including reasoning questions that ask you to explain or show your answer. This pack complements the main Topic 4.3 practice pack and does not share any questions with it. Show all of your working - method marks are available even when a final answer is wrong. Calculators are not allowed for this pack.

1 What is the smallest prime factor of 91?

(Total for Question 1 is 1 mark)

2 Write down the prime factorisation of 12 using powers if appropriate.

(Total for Question 2 is 1 mark)

3 Write the prime factorisation of 84.

(Total for Question 3 is 2 marks)

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4 Find the smallest positive integer k such that 288 x k is a square number.

(Total for Question 4 is 3 marks)

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5 Find the highest common factor (HCF) and the lowest common multiple (LCM) of 98 and 56.

(Total for Question 5 is 3 marks)

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6 Find the highest common factor (HCF) and the lowest common multiple (LCM) of 24 and 69.

(Total for Question 6 is 3 marks)

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7 Find the highest common factor (HCF) of 12 and 18.

(Total for Question 7 is 2 marks)

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8 Find the lowest common multiple (LCM) of 4 and 6.

(Total for Question 8 is 2 marks)

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9 Three bus services start together at 9:00. One bus comes every 12 minutes, the second every 15 minutes and the third every 20 minutes. After how many minutes will they next all arrive together at the stop?

(Total for Question 9 is 2 marks)

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10 Express 2310 as a product of prime factors.

(Total for Question 10 is 2 marks)

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11 Write $2^3 \times 3^2 \times 5$ as an ordinary number.

(Total for Question 11 is 2 marks)

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12 Find the HCF of 24 and 36.

(Total for Question 12 is 2 marks)

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13 Find the LCM of 9 and 15.

(Total for Question 13 is 2 marks)

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14 Find the smallest positive integer n such that LCM(n, 6) = 60. Show how you find n.

(Total for Question 14 is 3 marks)

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15 Find the least common multiple (LCM) of 40 and 96 using prime factors.

(Total for Question 15 is 3 marks)

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16 Two buses leave the same stop at 08:00. One bus completes a lap every 18 minutes, the other every 30 minutes. At what time after 08:00 will both buses next arrive at the stop together? Give your answer in hours and minutes.

(Total for Question 16 is 3 marks)

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17 Using prime factorisation, find the HCF and LCM of 30 and 45.

(a) Find the HCF of 30 and 45. **(2)**

.....

(b) Find the LCM of 30 and 45. **(2)**

.....

(Total for Question 17 is 4 marks)

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18 Find the HCF of 45, 60 and 75.

(Total for Question 18 is 2 marks)

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19 Find the LCM of 6, 8 and 10.

(Total for Question 19 is 2 marks)

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20 Three warning lights on a factory control panel all flash together at the start of a shift. The red light then flashes every 8 seconds, the amber light every 12 seconds and the green light every 20 seconds. Find how many seconds it takes until all three lights next flash together.

(Total for Question 20 is 3 marks)

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Mark scheme · 4.3 Prime Factors, HCF and LCM: 1-hour Pack

Question 1

7 cao **B1**

Answer: 7

Question 2

$2^2 * 3$ cao **B1**

Answer: $2^2 * 3$

Question 3

correct method or factors shown, e.g. 84 = 12 * 7, 12 = 3 * 4 **M1**

$2^2 * 3 * 7$ cao **A1**

Answer: $2^2 * 3 * 7$

Question 4

288 = 2^5 x 3^2 **M1**

identifies the primes with odd powers **M1**

k = 2 **A1**

Answer: k = 2

Question 5

prime factorisations or lists of factors/multiples **M1**

HCF = 14 **A1**

LCM = 392 **A1**

Answer: HCF = 14, LCM = 392

Question 6

prime factorisations or lists of factors/multiples **M1**

HCF = 3 **A1**

LCM = 552 **A1**

Answer: HCF = 3, LCM = 552

Question 7

12 = 2^2 x 3 and 18 = 2 x 3^2, or an equivalent listing/comparison of factors **M1**

6 cao **A1**

Answer: 6

Question 8

4 = 2^2 and 6 = 2 x 3, or a correct list of multiples of each number **M1**

12 cao **A1**

Answer: 12

Question 9

method to find LCM of 12, 15 and 20, e.g. prime factors 12=2^2*3, 15=3*5, 20=2^2*5 **M1**

60 minutes cao **A1**

Answer: 60 minutes

Question 10

correct division tree or primes shown, e.g. 2310 = 2 x 3 x 5 x 7 x 11 (method) **M1**

2310 = 2 x 3 x 5 x 7 x 11 cao **A1**

Answer: 2 x 3 x 5 x 7 x 11 (2310 = 2 x 3 x 5 x 7 x 11)

Question 11

2^3 = 8 and 3^2 = 9 (or 8 x 9 = 72) evaluated correctly **M1**

360 cao **A1**

Answer: 360

Question 12

24 = 2^3 x 3 and 36 = 2^2 x 3^2, or an equivalent listing/comparison of factors **M1**

12 cao **A1**

Answer: 12

Question 13

9 = 3^2 and 15 = 3 x 5, or a correct list of multiples of each number **M1**

45 cao **A1**

Answer: 45

Question 14

use prime factors: 6 = 2 * 3 and 60 = 2^2 * 3 * 5, show need for extra 2 and 5 **M1**

deduce n must provide the missing prime powers, e.g. must have 2^2 and 5 **M1**

n = 20 cao **A1**

Answer: 20

Question 15

correct prime factorisations, e.g. 40 = 2^3 x 5, 96 = 2^5 x 3 **M1**

take highest powers: 2^5 x 3 x 5 **M1**

LCM = 32 x 3 x 5 = 480 cao **A1**

Answer: 480

Question 16

find LCM of 18 and 30, e.g. 18 = 2 x 3^2, 30 = 2 x 3 x 5 so LCM = 2 x 3^2 x 5 = 90 **M1**

convert 90 minutes to hours and minutes **M1**

90 minutes = 1 hour 30 minutes, so both buses meet at 09:30 cao **A1**

Answer: 09:30 (1 hour 30 minutes after 08:00)

Question 17

(a) 30 = 2 x 3 x 5 and 45 = 3^2 x 5 shown **M1**

(a) 15 cao **A1**

(a) Answer: 15

(b) highest power of each prime identified, 2^1, 3^2 and 5^1 **M1**

(b) 90 cao **A1**

(b) Answer: 90

Question 18

45 = 3^2 x 5, 60 = 2^2 x 3 x 5 and 75 = 3 x 5^2 all shown **M1**

15 cao **A1**

Answer: 15

Question 19

6 = 2 x 3, 8 = 2^3 and 10 = 2 x 5 all shown **M1**

120 cao **A1**

Answer: 120

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Question 20

$8 = 2^3$, $12 = 2^2 \times 3$ and $20 = 2^2 \times 5$ all shown (or an equivalent listing of multiples of all three numbers)	**M1**
highest power of each prime identified, 2^3, 3^1 and 5^1	**M1**
120 cao (accept 2 minutes)	**A1**

Answer: 120 seconds (2 minutes)

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