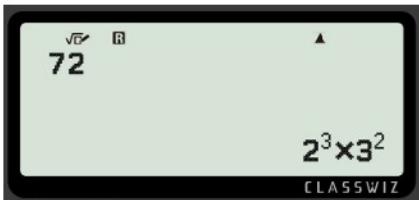


3 Find the highest common factor (HCF) of 72 and 108  
Show your working clearly.



$$72 = (2) \times (2) \times 2 \times (3) \times (3)$$
$$108 = \cancel{2} \times \cancel{2} \times \cancel{3} \times \cancel{3} \times 3$$

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

$$= 36$$

(Total for Question 3 is 2 marks)

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## January 2020 P1H

2 Find the lowest common multiple (LCM) of 28 and 105

$$28 = 2 \times 2 \times 7$$
$$105 = 3 \times 5 \times 7$$

$$\text{LCM} = 2 \times 2 \times 7 \times 3 \times 5$$
$$= 420$$

(Total for Question 2 is 2 marks)



## January 2022 Paper 2H

7 Find the lowest common multiple (LCM) of 28, 42 and 63  
Show your working clearly.

$$\begin{array}{rcl} 28 & = & 2 \times 2 \\ 42 & = & \cancel{2} \times 3 \\ 63 & = & \cancel{3} \times 3 \\ & & \times \cancel{3} \times 7 \end{array}$$

$$\text{Lcm} = 2 \times 2 \times 3 \times 3 \times 7$$

$$= 252$$

(Total for Question 7 is 3 marks)

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## January 2021 Paper 1HR

9  $A = 2^8 \times 3^5 \times 11^4$      $B = 2^6 \times 3 \times 11^8$

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

$$A = (2)(2)(2)(2)(2)(2) 2 \quad 2 \quad (3) 3 \quad 3 \quad 3 \quad 3$$
$$B = (2)(2)(2)(2)(2)(2) (3) B (11)(11)(11)(11) 11 \quad 11 \quad 11 \quad 11$$

$$HCF = 2^6 \times 3 \times 11^4$$

(2)

(b) Find the lowest common multiple (LCM) of  $2A$  and  $3B$ .

Give the LCM as a product of powers of its prime factors.

$$2A = (2)(2)(2)(2)(2)(2) 2 \quad 2$$
$$3B = (2)(2)(2)(2)(2)(2) (3)(3) 3 \quad 3 \quad 3$$
$$(11)(11)(11)(11) 11 \quad 11 \quad 11 \quad 11$$

$$LCM = 2^8 \times 3^5 \times 11^8$$

(2)

(Total for Question 9 is 4 marks)



**January 2022 Paper 1HR**

6 (a) Work out the lowest common multiple (LCM) of 36 and 120

$$36 = \cancel{2} \times \cancel{2} \times 3 \times 3$$

$$120 = \cancel{2} \times \cancel{2} \times 2 \times \cancel{3} \times 3 \times 5$$

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

$$= 360$$

(2)

$$A = 5^2 \times 7^4 \times 11^p$$

$$B = 5^m \times 7^{n-5} \times 11$$

$m$ ,  $n$  and  $p$  are integers such that

$$m > 2$$

$$n > 10$$

$$p > 1$$

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

Give your answer as a product of powers of its prime factors.

 $11^p \rightarrow p > 1$ 

$$A = \cancel{5} \times \cancel{5}$$

$$B = \cancel{5} \times \cancel{5} \times 5$$

$$5^m \rightarrow m > 2$$

$$7 \times \cancel{7} \times \cancel{7} \times \cancel{7} \times \cancel{7}$$

$$7^{n-5} \rightarrow n > 10$$

$$11 \times 11$$

$$\text{HCF} = 5^2 \times 7^4 \times 11$$

(2)

(Total for Question 6 is 4 marks)





## January 2019 P2H

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6 (a) Find the highest common factor (HCF) of 96 and 120

$$96 = (2 \times 2 \times 2) \times 2 \times 2 \times 3$$

$$120 = (2 \times 2 \times 2) \times 3 \times 5$$

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

$$= 24$$

(2)

$$A = 2^3 \times 5 \times 7^2 \times 11$$

$$B = 2^4 \times 7 \times 11$$

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

(b) Find the lowest common multiple (LCM) of  $A$ ,  $B$  and  $C$ .

$$A = (2 \times 2 \times 2) \times 5 \times 7 \times 11$$

$$B = (2 \times 2 \times 2) \times 7 \times 11$$

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

(2)

(Total for Question 6 is 4 marks)

$$\text{LCM} = 2^4 \times 3 \times 5^2 \times 7^2 \times 11$$

$$= 646800$$

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# January 2021 P2H

9

$$A = 2^3 \times 3^2 \times 5^2 \times 11$$

$$B = 2^4 \times 3 \times 5^4 \times 13$$

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

Give your answer as a product of powers of prime numbers.

$$A = (2)(2)(2) \quad 2 \quad (3) \quad 3$$
$$B = (\cancel{2})(\cancel{2})(\cancel{2}) \quad 2 \quad (\cancel{3}) \quad 3$$
$$(\cancel{5})(\cancel{5}) \quad 5 \quad 5$$
$$11$$
$$13$$

$$\text{Lcm} = 2^4 \times 3^2 \times 5^4 \times 11 \times 13$$

(Total for Question 9 is 2 marks)

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P 6 6 3 0 1 A 0 1 1 2 8

11

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## January 2023 Paper 2HR

7 (a) Find the highest common factor (HCF) of 200 and 420

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

$$420 = 2^2 \times 3 \times 5 \times 7$$

$$200 = \begin{array}{c} (2) \\ (2) \end{array} 2$$
  
$$420 = \begin{array}{c} (2) \\ (2) \end{array} 3$$

$$5 \begin{array}{c} (5) \\ (x) \end{array} 7$$

$$\begin{aligned} \text{HCF} &= 2^2 \times 5 \\ &= 20 \end{aligned}$$

(2)

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

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

$$C = 3 \times 5^2 \times 11$$

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

Write your answer as a product of powers of prime factors.

$$A = \begin{array}{c} (2) \\ (2) \\ (2) \end{array}$$

$$B = \begin{array}{c} (3) \\ (x) \\ (x) \end{array} 3$$

$$C = \begin{array}{c} (5) \\ (x) \\ (x) \end{array} 5$$

$$\begin{array}{c} (7) \\ (x) \\ (x) \end{array}$$

$$11$$

$$\text{LCM} = 2^3 \times 3^2 \times 5^2 \times 7^2 \times 11$$

(2)

(Total for Question 7 is 4 marks)



8  $A = 3^5 \times 5 \times 7^3$   
 $B = 2^3 \times 3 \times 7^4$

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

$$A = \begin{array}{ccccccc} 3 & 3 & 3 & 3 & 5 & 7 & 7 \\ \textcircled{3} & \textcircled{3} & \textcircled{3} & \textcircled{3} & \textcircled{7} & \textcircled{7} & \textcircled{7} \\ \textcircled{X} & & & & \textcircled{X} & \textcircled{X} & \textcircled{X} \end{array}$$

$$B = \begin{array}{ccccccc} 2 & 2 & 2 & & & & 7 \\ \textcircled{2} & \textcircled{2} & \textcircled{2} & & & & \textcircled{7} \end{array}$$

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

(ii) Find the Lowest Common Multiple (LCM) of  $A$  and  $B$ .

$$\text{LCM} = 2^3 \times 3^5 \times 5 \times 7^4$$

(2)

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

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

$$C = 2^p \times 5^q \times 7^r$$

Given that

the HCF of  $B$  and  $C$  is  $2^3 \times 7$

the LCM of  $A$  and  $C$  is  $2^4 \times 3^5 \times 5^2 \times 7^3$

(b) find the value of  $p$ , the value of  $q$  and the value of  $r$ .

$$\text{If HCF of } B \text{ & } C = 2^3 \times 7$$

$$B = \begin{array}{ccccccc} 2 & 2 & 2 & 3 & 7 & 7 & 7 \\ \textcircled{2} & \textcircled{2} & \textcircled{2} & \textcircled{3} & \textcircled{7} & \textcircled{7} & \textcircled{7} \end{array}$$

$$C = \begin{array}{ccccccc} 2 & 2 & 2 & ? & 5^q & 7 & 7 \\ \textcircled{2} & \textcircled{2} & \textcircled{2} & \textcircled{?} & \textcircled{5^q} & \textcircled{7} & \textcircled{7} \end{array}$$

$$r = 1$$

$$\text{LCM of } A \text{ & } C = 2^4 \times 3^5 \times 5^2 \times 7^3$$

$$A = \begin{array}{ccccccc} 3 & 3 & 3 & 3 & 3 & 7 & 7 \\ \textcircled{3} & \textcircled{3} & \textcircled{3} & \textcircled{3} & \textcircled{3} & \textcircled{7} & \textcircled{7} \\ \textcircled{X} & \textcircled{5} & & & & \textcircled{7} & \textcircled{7} \end{array}$$

$$C = 2 \ 2 \ 2 \ 2$$

$$p = 4$$

$$p = \dots \quad 4$$

$$q = \dots \quad 2$$

$$r = \dots \quad 1$$

(2)

(Total for Question 8 is 4 marks)



8

$$A = 3^2 \times 5^4 \times 7 \quad B = 3^4 \times 5^3 \times 7 \times 11$$

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

$$A = \begin{array}{c} (3) \\ (3) \\ \times \quad \times \end{array} \quad 3 \quad 3 \quad \begin{array}{c} (5) \\ (5) \\ (5) \\ \times \quad \times \quad \times \end{array} \quad 5 \quad \begin{array}{c} (7) \\ \times \end{array} \quad 11$$

$$\text{HCF} = 3^2 \times 5^3 \times 7$$

(2)

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

$$\text{LCM} = 3^4 \times 5^4 \times 7 \times 11$$

(2)

(Total for Question 8 is 4 marks)

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## June 2022 P1H

3 (a) Find the highest common factor (HCF) of 56 and 84  
Show your working clearly.

$$\begin{array}{rcl} 56 = 2^3 \times 7 & = & (2)(2)2 \\ 84 = 2^2 \times 3 \times 7 & = & (\cancel{2})(\cancel{2})3 \\ & & (7) \\ & & (\cancel{7}) \end{array}$$

$$\text{HCF} = 2^2 \times 7$$

(2)

(b) Find the lowest common multiple (LCM) of 60 and 72  
Show your working clearly.

$$\begin{array}{rcl} 60 = 2^2 \times 3 \times 5 & = & (2)(2)5 \\ 72 = 2^3 \times 3^2 & = & (\cancel{2})(\cancel{2})2(\cancel{3})3 \end{array}$$

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

(2)

(Total for Question 3 is 4 marks)

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## June 2022 Paper 1HR

12  $P = 3^3 \times 5^2 \times 7$   
 $Q = 3^2 \times 5 \times 7^2$

(a) Write down the highest common factor (HCF) of  $P$  and  $Q$

$$P = (3)(3)3 \quad (5)5 \quad (7)7$$
$$Q = (\cancel{3}\cancel{3}) \quad (\cancel{5}) \quad (\cancel{7})7$$

$$\text{HCF} = 3^2 \times 5 \times 7$$

(1)

$$P = 3^3 \times 5^2 \times 7$$
$$Q = 3^2 \times 5 \times 7^2$$

(b) Work out the value of  $P^3 \times Q$

Give your answer in the form  $3^x \times 5^y \times 7^z$  where  $x$ ,  $y$  and  $z$  are positive integers.

$$P^3 = (3^3 \times 5^2 \times 7)^3$$
$$= 3^9 \times 5^6 \times 7^3$$

$$P^3 \times Q = 3^9 \times 5^6 \times 7^3 \times 3^2 \times 5 \times 7^2$$
$$= 3^{11} \times 5^7 \times 7^5$$

(2)

(Total for Question 12 is 3 marks)



## June 2023 P1H

8 (a) Write 300 as a product of its prime factors.  
Show your working clearly.

$$\begin{array}{c} 300 \\ / \quad \backslash \\ 3 \quad 100 \\ / \quad \backslash \\ 2 \quad 50 \\ / \quad \backslash \\ 2 \quad 25 \\ / \quad \backslash \\ 5 \quad 5 \end{array}$$

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

(2)

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

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

(b) Find the lowest common multiple (LCM) of  $5A$  and  $7B$   
Show your working clearly.

$$\begin{array}{l} 5A = (2)(2)2 \quad (3)(3)3 \quad (5)5 \\ 7B = (\cancel{2})(\cancel{2}) \quad (\cancel{3})(\cancel{3}) \quad 3 \quad (\cancel{5})5 \quad 7 \end{array}$$

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

(2)

(Total for Question 8 is 4 marks)



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11  $A = 2^5 \times 5 \times 7^2$

$B = 2^3 \times 5^3 \times 7^4$

(a) Write down the highest common factor (HCF) of  $5A$  and  $2B$   
Give your answer as a product of prime factors.

$$5A = \begin{array}{c} (2) \\ (2) \\ (2) \\ (2) \\ (2) \end{array} 2 \quad \begin{array}{c} (5) \\ (5) \\ (5) \\ (5) \end{array} 5 \quad \begin{array}{c} (7) \\ (7) \\ (7) \\ (7) \end{array} 7 \quad 7$$

$$2B = \begin{array}{c} (2) \\ (2) \\ (2) \\ (2) \\ (2) \end{array} 2 \quad \begin{array}{c} (5) \\ (5) \\ (5) \\ (5) \end{array} 5 \quad \begin{array}{c} (7) \\ (7) \\ (7) \\ (7) \end{array} 7 \quad 7$$

$$\text{HCF} = 2^4 \times 5^2 \times 7^2$$

(2)

$A = 2^5 \times 5 \times 7^2$

$B = 2^3 \times 5^3 \times 7^4$

(b) Work out the value of  $(AB)^2$   
Give your answer as a product of prime factors.

$$AB = A \times B$$

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

$$AB = 2^8 \times 5^4 \times 7^6$$

$$(AB)^2 = (2^8 \times 5^4 \times 7^6)^2$$

$$= 2^{16} \times 5^8 \times 7^{12}$$

(2)

(Total for Question 11 is 4 marks)



# November 2023 P1H

7  $A = 5^3 \times 7^3 \times 11^6$  and  $B = 5^6 \times 7^2 \times 11^4$

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

Give your answer as a product of powers of its prime factors.

$$A = (5)(5)(5)$$

$$B = (\cancel{5})(\cancel{5})(\cancel{5}) \times 5$$

$$(7)(7)$$

$$(\cancel{7})(\cancel{7})$$

$$(11)(11)(11)(11)(11)(11)$$

$$(\cancel{11})(\cancel{11})(\cancel{11})(\cancel{11})(\cancel{11})(\cancel{11})$$

$$\text{HCF} = 5^3 \times 7^2 \times 11^4$$

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(Total for Question 7 is 2 marks)



# November 2024 P1H

6  $A = 2^3 \times 5^4 \times 7 \times 11$

$B = 2^2 \times 5^2 \times 7^2$

$C = 2^2 \times 5^3 \times 7^4$

Find the highest common factor (HCF) of  $A$ ,  $B$  and  $C$

Write your answer as a product of prime factors.

$$A = \cancel{(2)(2)}^1 \cancel{2}$$

$$B = \cancel{(7)(7)}^1 \cancel{7}$$

$$C = \cancel{(1)(1)}^1 \cancel{1}$$

$$C = \cancel{(7)(7)}^1 \cancel{7}$$

11

$$\text{HCF} = 2^2 \times 5^3 \times 7^2$$

(Total for Question 6 is 2 marks)



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# November 2020 P1H

10  $A = 2 \times 3^{43}$   
 $B = 16 \times 3^{37}$

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

$$16 = 2^4$$

$$A = 2 \times 3^{43} = \cancel{2} \times \overbrace{2 \times 2 \times 2 \times 3}^{37} \times \overbrace{3}^{37} \times \overbrace{3}^{6}$$
$$B = 2^4 \times 3^{37} = \cancel{2^4} \times \overbrace{2 \times 2 \times 2 \times 3}^{37} \times \overbrace{3}^{37}$$

$$HCF = 2 \times 3^{37}$$

(1)

(b) Express the number  $A \times B$  as a product of powers of its prime factors.  
Give your answer in its simplest form.

$$A \times B = 2 \times 3^{43} \times 2^4 \times 3^{37}$$
$$= 2^1 \times 2^4 \times 3^{43} \times 3^{37}$$
$$= 2^5 \times 3^{80}$$

(2)

(Total for Question 10 is 3 marks)

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