Prime Factors Problems

Time: 1 hour and 25 minutes

Score: _____/84

Surname: .....

Other names: .....

Mark Scheme and revision available:
www.addvancemaths.com/revision/primefactors

Instructions

- Use black ink or ball-point pen.
- Answer all questions.
- Answer the questions in the spaces provided
- If blank paper is used, write down the question's number
- You must show all your working out.

Information

- The marks for each question are shown in brackets.
- Blank paper is provided at the end if extra space is needed.
- The questions are arranged in order of increasing difficulty.

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Prime Factors Problems

1) Prime Factorise these numbers:

$12 =$	$15 =$	$18 =$
$19 =$	$40 =$	$100 =$
$190 =$	$400 =$	$1000 =$
$125 =$	$250 =$	$84 =$

(12)

2) Find the highest common factor of the following pairs:

a) 12 and 15 _____ **(2)**

b) 40 and 12 _____ **(2)**

c) 1000 and 700 _____ **(2)**

d) 36 and 48 _____ **(2)**

e) 700 and 280 _____ **(2)**

f) 640 and 480 _____ **(2)**

Prime Factors Problems

3) Find the lowest common multiple of the following pairs on numbers:

a) 12 and 15 _____ **(2)**

b) 40 and 13 _____ **(2)**

c) 1000 and 700 _____ **(2)**

d) 36 and 48 _____ **(2)**

e) 700 and 280 _____ **(2)**

f) 640 and 480 _____ **(2)**

Prime Factors Problems

4) Find the lowest common multiple of the following sets of numbers:

a) $12, 15$ and 18

_____ **(3)**

b) $400, 800$ and 120

_____ **(3)**

5) Consider $A = 2^3 \times 5^x \times 7^8$

Write the following as products of their prime factors:

a) $15A =$

_____ **(2)**

b) $4A =$

_____ **(2)**

c) $A^3 =$

_____ **(2)**

d) $\frac{3A}{7} =$

_____ **(2)**

Prime Factors Problems

6) Consider $A = 2^m \times 3^n \times 5^2 \times 7$ and $B = 2 \times 3^n \times 5^4 \times 11$ where m and n are integers larger than 2.

Write the following as products of their prime factors:

a) $AB =$

_____ **(2)**

b) $2AB^2 =$

_____ **(3)**

c) The highest common factor of A and B

_____ **(2)**

d) The lowest common multiple of A and B

_____ **(2)**

Prime Factors Problems

7) Consider $A = 2^{10} \times 3^{20} \times 5^{30}$

Write the following as products of their prime factors:

a) $10\mathrm{A} =$

_____ **(2)**

b) $\sqrt{\mathrm{A}} =$

_____ **(2)**

c) $\sqrt{81\mathrm{A}}$

_____ **(2)**

d) $\sqrt[5]{\mathrm{A}}$

_____ **(2)**

Prime Factors Problems

8a) Write $2^{12} \times 3^3 \times 5^{11}$ in standard form.
Show your working.

_____ **(3)**

b) The number of radioactive atoms in a sample of in a sample is 7.5×10^{28}. Write this number as a product of its prime factors.

_____ **(3)**

c) It is estimated that there are about 3.15×10^{79} protons in the universe.

Write this number as a product of its prime factors.

_____ **(3)**

Prime Factors Problems

9) Consider the number $N = 3^4 \times 5^6 \times 13^8$

a) Fred multiplies N by a number to make it even.

i) What is the smallest number Fred could have chosen?
Write your answer as an integer.

ii) Explain your answer. _____

_____

_____ **(2)**

b) Milly multiplies N by a number to make it a multiple of 42.

i) What is the smallest number Milly could have chosen?
Write your answer as an integer.

_____

ii) Explain your answer.

_____

_____ **(2)**

Question 9 Continued

$N = 3^4 \times 5^6 \times 13^8$

c) Ahmed multiplies N by a number to make it a square number.

i) What is the smallest number Ahmed could have chosen?
Write your answer as an integer.

_____

ii) Explain your answer.

_____

_____ **(2)**

d) Abby multiplies N by a number to make it a cube number.

i) What is the smallest number Abby could have chosen?
Write your answer as an integer.

_____

ii) Explain your answer.

_____

_____ **(2)**