

Factor Trees - Worksheet

Skill

Group A - Prime factors

State the composite number, given the prime factors.

1) 2 × 2	2) 5 × 7	3) 2 × 3 × 5
4) 2 × 3 × 3 × 5	5) 2×3^2	6) 3 × 7 × 11
7) 3×5^2	8) 3 × 7 × 13	9) $2^2 \times 3^2 \times 5$
10) $(2 \times 3 \times 5)^2$	11) $3^3 \times 7^2$	12) 5 ² × 7 × 19

Group B - Factor trees

Complete the missing values in each question.





Factor Trees - Worksheet



Group C - Factor trees

By using factor trees, write the prime factorisation for the following numbers. Write your answer in index form where possible.

1) 22	2) 34	3) 45
4) 20	5) 30	6) 32
7) 150	8) 72	9) 540
10) 91	11) 196	12) 240



Factor Trees - Worksheet

Applied

1) (a) Spot the mistake with the following calculation: Express 640 as a product of prime factors.



(b) Spot the mistake with the following calculation: Express 70 as a product of prime factors.



 $70 = 5^2 \times 7$

- 2) (a) Given that *a* and *b* are prime numbers, write the expression $84(a^2b)^3 \div 3ab$ as a product of prime factors.
 - (b) Let $720 = 2^{p} \times 3^{q} \times 5^{r}$ where p, q and r are integers. Calculate the values of p, q and r.
- 3) (a) Show that 324 is a square number.
 - (b) Use part a) to calculate the square root of 324.
- 4) (a) Given that $108 = 2^2 \times 3^3$, express 108^3 as a product of prime factors.
 - (b) A cube has a width of 10cm. Show that the volume of this cube is a cube number.



Factor Trees - Exam Questions

1) (a) Write the number 260 as a product of prime factors in index form.

(3)

(b) Hence or otherwise write 260^2 in index form.

(1) (4 marks)

2) (a) Jake is trying to answer this question:Express the number 96 as a product of prime factors. His answer is shown below.



96 = 2, 2, 2, 2, 3, 3, 2

Has Jake calculated the answer correctly? Explain your answer.

.....(4)



Factor Trees - Exam Questions

(b) Complete the different factor tree for the number 96 below. The start of the diagram has been drawn for you:



(4) (8 marks)

3) (a) Show that 225 is a square number.

(3)

(b) Let $N = 2 \times 3 \times 7$. Write $3N^2$ as a product of prime factors in index form.

(2) (5 marks)



Factor Trees - Exam Questions

4) (a) Express 60 as a product of prime factors.

(b) Simplify $\sqrt{60}$.

(2)

(3) (5 marks)



	Question	Answer
	Skill Questions	
Group A	State the composite number, given the prime factors. 1) 2×2 2) 5×7 3) $2 \times 3 \times 5$ 4) $2 \times 3 \times 3 \times 5$ 5) 2×3^2 6) $3 \times 7 \times 11$ 7) 3×5^2 8) $3 \times 7 \times 13$ 9) $2^2 \times 3^2 \times 5$ 10) $(2 \times 3 \times 5)^2$ 11) $3^3 \times 7^2$	 4 35 30 90 18 231 75 273 180 900 11) 1323
	12) $5^2 \times 7 \times 19$	12) 3325
Group B	Complete the missing values in each question. 1) 2) 1) 1) 2) 18 3 3	1) 1) 1) 1) 12 3 3 2) 18 9 3 3











Group C	By using factor trees, write the prime factorisation for the following numbers. Write your answer in index form where possible.	
	1) 22	1) 22 = 2 × 11
	2) 34	2) 34 = 2 × 17
	3) 45	3) $45 = 3^2 \times 5$
	4) 20	4) 20 = $2^2 \times 5$
	5) 30	5) 30 = 2 × 3 × 5
	6) 32	6) $32 = 2^5$
	7) 150	7) $150 = 2 \times 3 \times 5^2$
	8) 72	8) 72 = $2^3 \times 3^2$
	9) 540	9) 540 = $2^2 \times 3^3 \times 5$
	10) 91	10) 91 = 7 × 13
	11) 196	11) 196 = $2^2 \times 7^2$
	12) 240	12) $240 = 2^4 \times 3 \times 5$



	Qı	uestion	Ar	nswer
	Ap	oplied Questions		
1)	a)	Spot the mistake with the following calculation: Express 640 as a product of prime factors. $ \begin{array}{c} 640 \\ 8 \\ 4 \\ 2 \\ 2 \\ 2 \\ 2 \\ 2 \\ 2 \\ 4 \\ 2 \\ 2 \\ 2 \\ 2 \\ 2 \\ 2 \\ 2 \\ 2 \\ 2 \\ 2$	a)	Incorrect power of 2 Should be 2 ⁷ × 5
	b)	Spot the mistake with the following calculation: Express 70 as a product of prime factors. $70 = 5^{2} \times 7$	b)	Factor pair of 10 incorrect ($10 = 2 \times 5$, not 5×5) Should be $70 = 2 \times 5 \times 7$
2)	a)	Given that <i>a</i> and <i>b</i> are prime numbers, write the expression $84(a^2b)^3 \div 3ab$ as a product of prime factors.	a)	$2^2 \times 7 \times a^5 \times b^2$
	b)	Let $720 = 2^{p} \times 3^{q} \times 5^{r}$ where <i>p</i> , <i>q</i> and <i>r</i> are integers. Calculate the values of <i>p</i> , <i>q</i> and <i>r</i> .	b)	p = 4 q = 2 r = 1



3)	a)	Show that 324 is a square number.	a)	$324 = 2 \times 2 \times 9 \times 9$ $= 2 \times 2 \times 3 \times 3 \times 3 \times 3$ $= (2 \times 3^{2}) \times (2 \times 3^{2})$ $= (2 \times 3^{2})^{2}$
	b)	Use part a) to calculate the square root Of 324	b)	$2 \times 3^2 = 18$
4)	a)	Given that $108 = 2^2 \times 3^3$, express 108^3 as a product of prime factors.	a)	$108^3 = 2^6 \times 3^9$
	b)	A cube has a width of 10 <i>cm</i> . Show that the volume of this cube is a cube number.	b)	Volume = $1000cm^{3}$ $1000 = 10 \times 10 \times 10$ = $2 \times 5 \times 2 \times 5 \times 2 \times 5$ = $(2 \times 5)^{3}$



Factor Trees - Mark Scheme

		Question	Answer		
		Exam Questions			
1)	a)	Write the number 260 as a product of prime factors in index form.	$260 = 2 \times 2 \times 5 \times 13$ $260 = 2^{2} \times 5 \times 13$	(3) 3 2	
	b)	Hence or otherwise write 260 ² in index form.	$260^2 = 2^4 \times 5^2 \times 13^2$	(1)	
2)	a)	Jake is trying to answer this question: Express the number 96 as a product of prime factors. His answer is shown below. 96 4 4 4 4 4 4 4 6 2 3 3 96 = 2, 2, 2, 2, 3, 3, 2 Has Jake calculated the answer correctly? Explain your answer.	No. Factors of 6 are incorrect (should be 2 and 3) Factors of 8 are incorrect (should be 4 and 2) The prime factors should be r listed (96 = 2 × 2 × 2 × 2 $2^5 \times 3$)	nultiplied, not $2 \times 2 \times 3$ or	
	b)	Complete the different factor tree for the number 96 below. The start of the diagram has been drawn for you: 96 16	96 16 4 4 2 2 2 2 2	6 3 2 (4)	



Factor Trees - Mark Scheme

3)	a)	Show that 225 is a square number.	a)	$225 = 15 \times 15 = 3 \times 5 \times 3 \times 5$ = (3 × 5) × (3 × 5) = (3 × 5) ²	(3)
	b)	Let $N = 2 \times 3 \times 7$. Write $3N^2$ as a product of prime factors in index form.	b)	N2 = 22 × 32 × 72 3N2 = 22 × 33 × 72	(2)
4) :	a)	Express 60 as a product of prime factors.	a)	$60 = 2 \times 3 \times 2 \times 5$ $60 = 2^2 \times 3 \times 5$	(2)
	b)	Simplify $\sqrt{60}$.	b)	$\sqrt{60} = \sqrt{2^2 \times 3 \times 5}$ $= \sqrt{2^2} \times \sqrt{3 \times 5}$ $= 2\sqrt{15}$	(3)

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