Prime Factors - Worksheet

Skill

Group A - Identifying prime factors

Identify the prime factors of the following numbers:

1) 10 **2)** 12 **3)** 16

4) 18 **5)** 30 **6)** 100

7) 26 **8)** 42 **9)** 33

10) 64 **11)** 105 **12)** 242

Group B - Writing a number as a product of its prime factors

Express the following as a product of their prime factors. Give your answers in index form:

1) 18 **2)** 36 **3)** 90

4) 180 **5)** 45 **6)** 135

7) 225 **8)** 7 **9)** 28

10) 77 **11)** 154 **12)** 616

Prime Factors - Worksheet

Group C - Solving problems with prime factors

Use the given facts to solve the prime factor problems below:

1) Using the fact that $2 \times 3 = 6$, what is 30 as a product of its prime factors?

2) Using the fact that $2 \times 3 = 6$, what is 60 as a product of its prime factors?

3) Using the fact that $2 \times 3 = 6$, what is 120 as a product of its prime factors?

4) Using the fact that $2^2 \times 3 = 12$, what is 60 as a product of its prime factors?

5) Using the fact that $2^2 \times 3 = 12$, what is 36 as a product of its prime factors?

6) Using the fact that $2^2 \times 3 = 12$, what is 108 as a product of its prime factors?

7) Using the fact that $2 \times 3 \times 5 = 30$, what is 15 as a product of its prime factors?

8) Using the fact that $2 \times 3 \times 5 = 30$, what is 90 as a product of its prime factors?

9) Using the fact that $2 \times 3 \times 5 = 30$, what is 120 as a product of its prime factors?

10) Using the fact that $2 \times 3^2 \times 5 = 90$, what is 45 as a product of its prime factors?

11) Using the fact that $2 \times 3^2 \times 5 = 90$, what is 180 as a product of its prime factors?

12) Using the fact that $2 \times 3^2 \times 5 = 90$, what is 360 as a product of its prime factors?

Prime Factors - Worksheet

Applied

1) **(a)** Write 860 as a product of prime factors.
Express your answer in index form.

(b) Find the lowest number by which 860 would need to be multiplied to give a square number.

2) **(a)** Write 2464 as a product of prime factors.
Express your answer in index form.

(b) Find the lowest number by which 2464 would need to be multiplied by to give a cube number.

3) If $A = 3^a \times 5^b$ write the following as a product of prime factors.

(a) $3A$

(b) $5A$

(c) $25A$

4) By using their prime factor decomposition, decide whether the following numbers are square, cube or neither.

(a) 2×3

(b) $3^3 \times 7$

(c) $3^2 \times 7^2$

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

(e) $2^4 \times 5^4 \times 7^4$

(f) $2^6 \times 5^6 \times 7^6$

Prime Factors - Exam Questions

1) Express 108 as a product of its prime factors.

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(3 marks)

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2) Write 36 as a product of its prime factors.

Give your answer in index form.

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(3 marks)

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

Work out the number.

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(2 marks)

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4) Given that $p = 2^4 \times 3$

(a) Calculate $10p$

.....

(2)

(b) Write $\frac{p}{4}$ as a product of its prime factors.

.....

(1)

(c) Write $20p$ as a product of primes.

.....

(2)

(5 marks)

Prime Factors - Answers

	Question	Answer
	Skill Questions	
Group A	Identify the prime factors of the following numbers: **1)** 10 **2)** 12 **3)** 16 **4)** 18 **5)** 30 **6)** 100 **7)** 26 **8)** 42 **9)** 33 **10)** 64 **11)** 105 **12)** 242	 **1)** 2 and 5 **2)** 2 and 3 **3)** 2 **4)** 2 and 3 **5)** 2, 3 and 5 **6)** 2 and 5 **7)** 2 and 13 **8)** 2, 3 and 7 **9)** 3 and 11 **10)** 2 **11)** 3, 5 and 7 **12)** 2 and 11
Group B	Express the following as a product of their prime factors. Give your answers in index form: **1)** 18 **2)** 36 **3)** 90 **4)** 180 **5)** 45 **6)** 135 **7)** 225 **8)** 7 **9)** 28 **10)** 77 **11)** 154 **12)** 616	 **1)** 2×3^2 **2)** $2^2 \times 3^2$ **3)** $2 \times 3^2 \times 5$ **4)** $2^2 \times 3^2 \times 5$ **5)** $3^2 \times 5$ **6)** $3^3 \times 5$ **7)** $3^2 \times 5^2$ **8)** 7 **9)** $2^2 \times 7$ **10)** 7×11 **11)** $2 \times 7 \times 11$ **12)** $2^3 \times 7 \times 11$

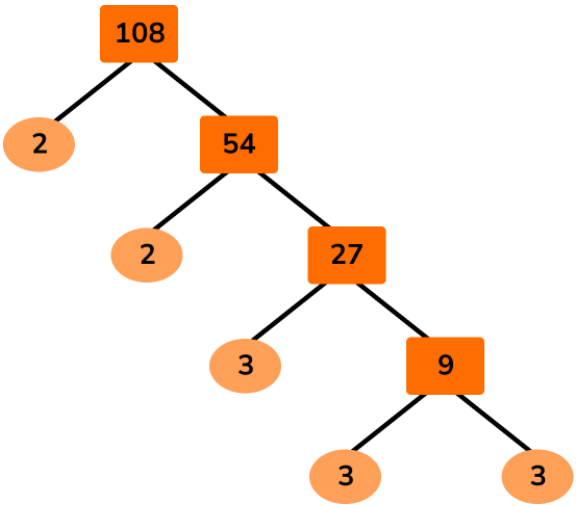
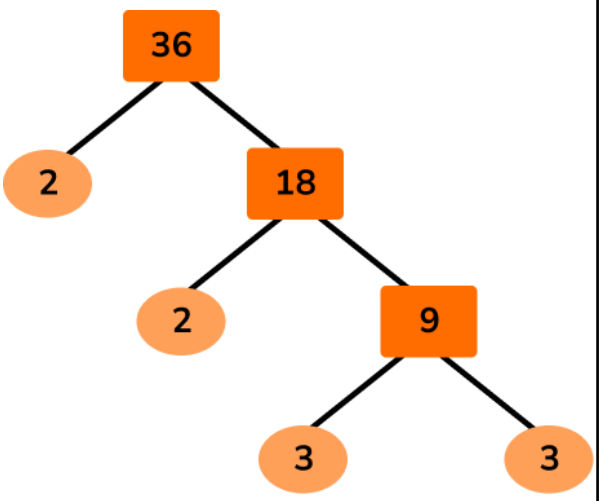
Prime Factors - Answers

Group C	Use the given facts to solve the prime factor problems below: **1)** Using the fact that $2 \times 3 = 6$, what is 30 as a product of its prime factors. **2)** Using the fact that $2 \times 3 = 6$, what is 60 as a product of its prime factors. **3)** Using the fact that $2 \times 3 = 6$, what is 120 as a product of its prime factors. **4)** Using the fact that $2^2 \times 3 = 12$, what is 60 as a product of its prime factors. **5)** Using the fact that $2^2 \times 3 = 12$, what is 36 as a product of its prime factors. **6)** Using the fact that $2^2 \times 3 = 12$, what is 108 as a product of its prime factors. **7)** Using the fact that $2 \times 3 \times 5 = 30$, what is 15 as a product of its prime factors. **8)** Using the fact that $2 \times 3 \times 5 = 30$, what is 90 as a product of its prime factors. **9)** Using the fact that $2 \times 3 \times 5 = 30$, what is 120 as a product of its prime factors. **10)** Using the fact that $2 \times 3^2 \times 5 = 90$, what is 45 as a product of its prime factors. **11)** Using the fact that $2 \times 3^2 \times 5 = 90$, what is 180 as a product of its prime factors. **12)** Using the fact that $2 \times 3^2 \times 5 = 90$, what is 360 as a product of its prime factors.	**1)** $30 = 6 \times 5$ $30 = 2 \times 3 \times 5$ **2)** $60 = 6 \times 10$ $60 = 2^2 \times 3 \times 5$ **3)** $120 = 6 \times 20$ $120 = 2^3 \times 3 \times 5$ **4)** $60 = 12 \times 5$ $60 = 2^2 \times 3 \times 5$ **5)** $36 = 12 \times 3$ $36 = 2^2 \times 3^2$ **6)** $108 = 12 \times 9$ $108 = 2^2 \times 3^3$ **7)** $15 = 30 \div 2$ $15 = 3 \times 5$ **8)** $90 = 30 \times 3$ $90 = 2 \times 3^2 \times 5$ **9)** $120 = 30 \times 4$ $120 = 2^3 \times 3 \times 5$ **10)** $45 = 90 \div 2$ $45 = 3^2 \times 5$ **11)** $180 = 90 \times 2$ $180 = 2^2 \times 3^2 \times 5$ **12)** $360 = 90 \times 4$ $360 = 2^3 \times 3^2 \times 5$

Prime Factors - Answers

	Question	Answer
	Applied Questions	
1)	**a)** Write 860 as a product of prime factors. Express your answer in index form. **b)** Find the lowest number by which 860 would need to be multiplied to give a square number.	**a)** $2^2 \times 5 \times 43$ **b)** $5 \times 43 = 215$
2)	**a)** Write 2464 as a product of prime factors. Express your answer in index form. **b)** Find the lowest number by which 2464 would need to be multiplied by to give a cube number.	**a)** $2^5 \times 7 \times 11$ **b)** $2 \times 7^2 \times 11^2 = 11858$
3)	If $A = 3^a \times 5^b$ write the following as a product of prime factors. **a)** $3A$ **b)** $5A$ **c)** $25A$	**a)** $3A = 3^{a+1} \times 5^b$ **b)** $5A = 3^a \times 5^{b+1}$ **c)** $25A = 3^a \times 5^{b+2}$
4)	By using their prime factor decomposition, decide whether the following numbers are square, cube or neither. **a)** 2×3 **b)** $3^3 \times 7$ **c)** $3^2 \times 7^2$ **d)** $2^3 \times 5^3$ **e)** $2^4 \times 5^4 \times 7^4$ **f)** $2^6 \times 5^6 \times 7^6$	**a)** Neither **b)** Neither **c)** Square **d)** Cube **e)** Square **f)** Square and Cube

Prime Factors - Mark Scheme

	Question	Answer	
	Exam Questions		
1)	Express 108 as a product of its prime factors.	$2 \times 2 \times 3 \times 3 \times 3$ or $2^2 \times 3^3$  Any correct factor pair of 108 **(1)** A fully correct prime factor tree **(1)** Correct answer **(1)**	**(3)**
2)	Write 36 as a product of its prime factors. Give your answer in index form.	$2^2 \times 3^2$  Any correct factor pair of 36 **(1)** A fully correct prime factor tree **(1)** Correct answer **(1)**	**(3)**

Prime Factors - Mark Scheme

3)	A number is written as a product of its prime factors as $2^3 \times 3 \times 5$. Work out the number.	$8 \times 3 \times 5$ **(1)** 120 **(1)**	**(2)**
4) (a)	Given that $p = 2^4 \times 3$ Calculate $10p$.	**(a)** $2^4 \times 3 = 48$ **(1)** $48 \times 10 = 480$ **(1)**	**(2)**
(b)	Write $\frac{p}{4}$ as a product of its prime factors.	**(b)** $2^2 \times 3$	**(1)**
(c)	Write $20p$ as a product of primes.	**(c)** $20 \times 2^4 \times 3$ **(1)** $2^6 \times 3 \times 5$ **(1)**	**(2)**