Step 4: Optional trick for checking divisibility

- 2: even numbers
- 3: sum of digits divisible by 3
- 5: ends with 0 or 5
- 7, 11, 13, ...: smaller prime checks or trial division

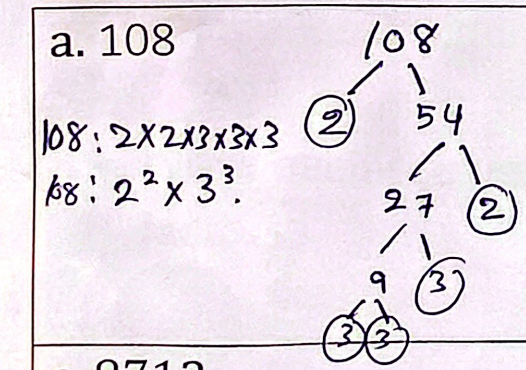
Step 5: Write as a product of primes

- Multiply all the prime numbers you divided by.
- Example: $2400=2^5\times3\times5^2$

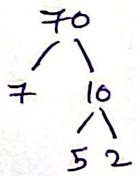
Here are some questions.

- Write these numbers as a product of prime numbers.

a. 108



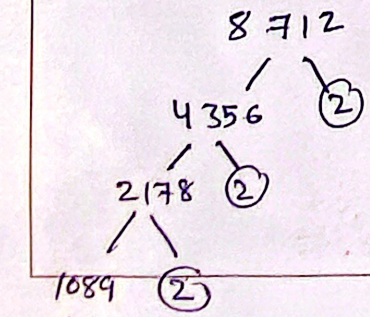
b. 70^3



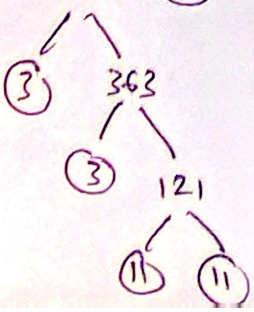
70 : 7x5x2

70^3 : $7^3 \times 5^3 \times 2^3$.

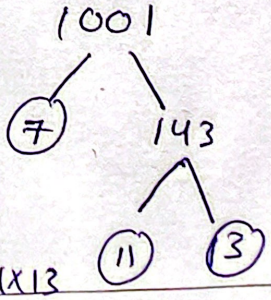
c. 8712



8712: $2^3 \times 3^2 \times 11^2$



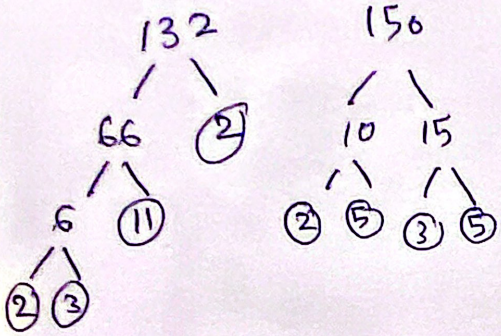
d. 1001



1001 : 7x11x13

- Use a factor tree to write 132 and 150 as a product of prime numbers.

132×150=19800. Use this fact to write 19800 as a product of prime numbers.



$132 : 11 \times 3 \times 2^2$

$150 : 2 \times 3 \times 5^2$.

$132 \times 150 = 19800$.

$(11 \times 3 \times 2^2) \times (2 \times 3 \times 5^2) = 19800$

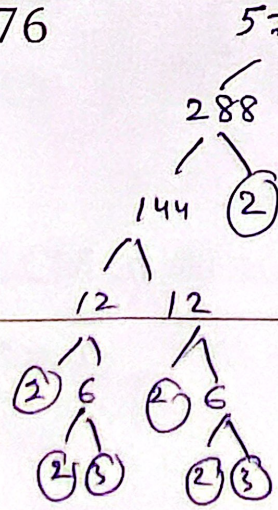
$11 \times 3^2 \times 2^3 \times 5^2 = 19800$.

- Work out the following.

a. $2 \times 3 \times 7$	b. $2^2 \times 3^2 \times 7^2$
$6 \times 7 = 42$	$4 \times 9 \times 49$ $36 \times 49 = 1764$.

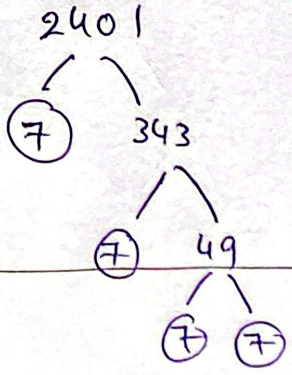
- Write each square number as a product of its prime factors.

a. 576



$576 : 2^6 \times 3^2$

b. 2401



$2401 : 7^4$

Prime Factorization of a Square Number:

- A square number is made by multiplying a number by itself.
- When you write it as prime factors, all the powers are **even.**

Example:

- $16=4^2$
- Prime factorization of 4: 2×2
- Prime factorization of 16: $2^2\times2^2=2^4$

Simple rule: **All exponents in a square number's prime factorization are even.**

- When a square number is written as a product of prime numbers, what can you say about the factors?

Every prime Factor appears with an even exponent/index
or → there is an even number of each prime factor.

- If $40=2\times2\times2\times5$ and $28=2\times2\times7$
  Use these facts to find

$40: 2^3\times5$
$28: 2^2\times7$

a. the HCF of 40 and 28

$HCF = 2^2 = 2\times2 = 4$

b. The LCM of 40 and 28

$LCM = 2^3\times5\times7$

$8\times5\times7$

40×7

$= 280$

- Write 396 as a product of prime numbers. Then write 168 as a product of prime numbers.

$396 = 2^2 \times 3^2 \times 11$

$168 = 2^3 \times 3 \times 7$

a. Find the HCF of 396 and 168

$HCF = 2^2 \times 3^1$

$4 \times 3 = 12$

b. Find the LCM of 396 and 168

$LCM = 2^3 \times 3^2 \times 11 \times 7$

$8 \times 9 \times 11 \times 7$

$72 \times 77 = 5,544.$

- Write 343 as a product of prime numbers. Then write 546 as a product of prime numbers.

$343 = 7^3$

$546 = 2 \times 3 \times 7 \times 13.$

- a. Find the HCF of 343 and 546

$HCF = 7$

- b. Find the LCM of 343 and 546

$LCM = 7^3 \times 2 \times 3 \times 13$

$343 \times 6 \times 13$

$26,754.$

- The HCF of two numbers is 6. The LCM of the two numbers is 72. What are the two numbers?

HCF = 6 LCM = 72 HCF × LCM = 6 × 72 = 432

→ Since the HCF is 6, then the two Number we're searching for must be multiples of 6.

6, 12, 18, 24, 30, 36, 42, ... (the product of the two numbers must be 432),

↳ the two numbers are 18 and 24,

the product of the two Numbers must be 432

- Read Rebeca's exam answers. Mark as correct or incorrect or incomplete. Correct the mistakes. The first one has been done for you.

a. A prime factor is a number that cannot be divided by a whole number greater than one.

for example, 2 and 3 are prime factors of 12.

Incorrect, A prime factor is any prime number divides equally into another number

b. A factor tree is a diagram that shows all the prime factors of a number.

Incomplete. It shows all the factors of a number, ending with prime factors.

c. The index tells us how many times to multiply the base number by itself.

Correct.

d. HCF stands for highest calculated factor.

Incorrect 'HCF' stands for highest common factor.

ill in the missing words in these definitions of maths terms.
he first one has been done for you.

CM stands for lowest common multiple

n integer is any positive or negative whole number or the
umber Zero

/hen the teacher asks you for a conjecture, you do not
eed to work out the answer,
ou just need to ~~give your opinion~~/suggestion based on what you know

2^3	We say this number as 2 to the power of 3

Name: Answer key.

Date: _____

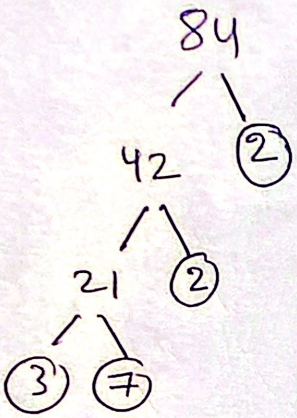
Lesson 1.1

Factors, Multiples and Primes

Grade 7A

Homework (2)

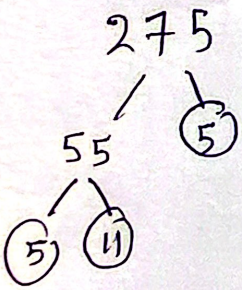
Q1. Write **84** as a product of its **Prime Factors.**



$84 = 2 \times 2 \times 7 \times 3$

$84 = 2^2 \times 7 \times 3$

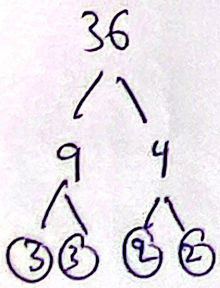
Q2. Draw a Factor Tree for **275**, then write it as a product of its prime factors.



$275 = 11 \times 5 \times 5$

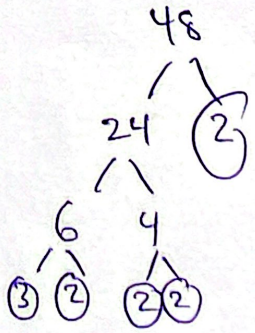
$275 = 11 \times 5^2$

Q3. Find the HCF of **36 and 48.**



$36 = 2 \times 2 \times 3 \times 3$

$36 = 2^2 \times 3^2$.

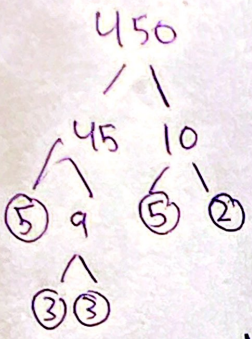


$48 = 2 \times 2 \times 2 \times 2 \times 3$

$48 = 2^4 \times 3$

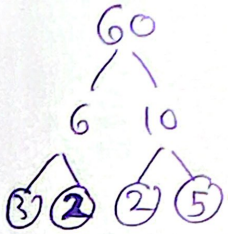
$HCF = 2^2 \times 3^1 = 4 \times 3 = 12$.

Q4. Find the LCM of **450 and 60**.



$450 = 5 \times 5 \times 2 \times 3 \times 3$

$450 = 5^2 \times 2 \times 3^2$



$60 = 3 \times 2 \times 2 \times 5$

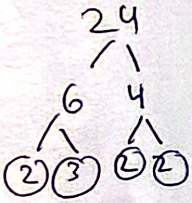
$= 3 \times 2^2 \times 5$

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

$4 \times 9 \times 25$

$36 \times 25 = 900.$

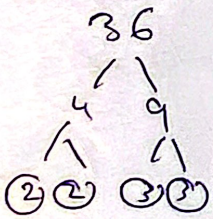
Q5. Two numbers are 24 and 36. Use prime factorization to find their HCF and LCM.



$24 = 2^3 \times 3$

$HCF = 2^2 \times 3^1$

$4 \times 3 = 12$

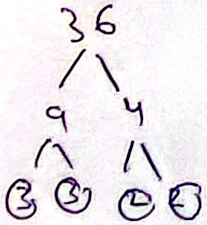


$36 = 2^2 \times 3^2$

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

$8 \times 9 = 72.$

Q6. Write 36^2 as a product of Prime numbers.



$36 = 2^2 \times 3^2$

$36^2 = (2^2 \times 3^2)^2$

$36^2 = 2^4 \times 3^4.$

e: Answer key · Lesson 1.3 Grade 7A

: _____ Square roots and cube roots Homework (2)

Evaluate.

$4^3 = 4\times4\times4 = 64$ $3^3 = 3\times3\times3 = 27$ $10^3 = 10\times10\times10 = 1000$

$6^3 = 6\times6\times6 = 216$ $(-2)^3 = (-2)\times(-2)(-2) = -8$ $8^3 = 8\times8\times8 = 512$

$(-5)^3 = -5\times-5\times-5 = -125$ $9^3 = 9\times9\times9 = 729$ $7^3 = 7\times7\times7 = 343$

$\sqrt[3]{27} = 3$ $\sqrt[3]{125} = 5$ $\sqrt[3]{-8} = -2$

$\sqrt[3]{216} = 6$ $\sqrt[3]{-64} = -4$ $\sqrt[3]{1000} = 10$

$\sqrt[3]{64} = 4$ $\sqrt[3]{-1} = -1$ $\sqrt[3]{512} = 8$

Evaluate.

$8^2 = 8 \times 8 = 64$ $3^2 = 3 \times 3 = 9$ $10^2 = 10 \times 10 = 100$

$6^2 = 6 \times 6 = 36$ $12^2 = 12 \times 12 = 144$ $7^2 = 7 \times 7 = 49$

$5^2 = 5 \times 5 = 25$ $9^2 = 9 \times 9 = 81$ $11^2 = 11 \times 11 = 121$

$\sqrt{16} = 4$ or -4 $\sqrt{9} = 3$ or -3 $\sqrt{4} = 2$ or -2

$\sqrt{25} = 5$ or -5 $\sqrt{49} = 7$ or -7 $\sqrt{100} = 10$ or -10

$\sqrt{64} = 8$ or -8 $\sqrt{36} = 6$ or -6 $\sqrt{121} = 11$ or -11

$\sqrt{81} = 9$ or -9 $\sqrt{144} = 12$ or -12 $\sqrt{225} = 15$ or -15

Unit 1

Name: Answer key. Lesson 1.4 Grade 7A

Date: _____ Indices Homework (3)

Directions: Rewrite each of the following exponents in expanded form and then solve. The first example has already been completed for you.

1.) $2^3 = 2 \times 2 \times 2 = 8$

2.) $4^2 = 4 \times 4 = 16$

3.) $3^3 = 3 \times 3 \times 3 = 27$

4.) $5^4 = 5 \times 5 \times 5 \times 5 = 625$

5.) $6^2 = 6 \times 6 = 36$

6.) $8^3 = 8 \times 8 \times 8 = 512$

7.) $10^5 = 10 \times 10 \times 10 \times 10 \times 10 = 100,000$

8.) $12^2 = 12 \times 12 = 144$

9.) $7^4 = 7 \times 7 \times 7 \times 7 = 2401$

10.) $1^8 = 1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1 = 1$

Directions: Rewrite each of the following using exponents. The first example has already been completed for you.

11.) $9 \times 9 \times 9 = 9^3$

12.) $6 \times 6 \times 6 \times 6 = 6^4$

13.) $10 \times 10 \times 10 = 10^3$

14.) $4 \times 4 \times 4 = 4^3$

15.) $12 \times 12 = 12^2$

16.) $8 \times 8 \times 8 \times 8 \times 8 = 8^5$

17.) $2 \times 2 \times 2 = 2^3$

18.) $7 \times 7 \times 7 \times 7 \times 7 \times 7 = 7^6$

19.) $3 \times 3 = 3^2$

20.) $5 \times 5 \times 5 \times 5 = 5^4$

The Power Rule

$$(a^b)^c = a^{b \times c}$$

PART I: Use the power rule to solve each of the following. The first problem has already been solved for you.

1. $(7^2)^3 = 7^6$
2. $(2^5)^4 = 2^{20}$
3. $(10^6)^2 = 10^{12}$
4. $(8^4)^4 = 8^{16}$
5. $(12^4)^2 = 12^8$
6. $(3^9)^3 = 3^{27}$
7. $(2^7)^3 = 2^{21}$
8. $(16^6)^8 = 16^{48}$
9. $(5^{12})^4 = 5^{48}$
10. $(13^{14})^6 = 13^{84}$
11. $(24^6)^{11} = 24^{66}$
12. $(6^9)^3 = 6^{27}$

PART II: Use the power rule to solve each of the following. The first problem has already been solved for you.

13. $(x^5)^2 = x^{10}$
14. $(y^4)^9 = y^{36}$
15. $(c^2)^2 = c^4$
16. $(m^{12})^{10} = m^{120}$
17. $(g^{11})^2 = g^{22}$
18. $(x^{15})^4 = x^{60}$
19. $(w^7)^9 = w^{63}$
20. $(x^{14})^4 = x^{56}$
21. $(y^7)^7 = y^{49}$
22. $(z^3)^{17} = z^{51}$
23. $(r^{25})^5 = r^{125}$
24. $(x^{16})^6 = x^{96}$

Unit 1

Name: Answer Key. Lesson 1.4 Grade 7A

Date: _____ Indices Homework (4)

The Product Property

$$a^b \times a^c = a^{b+c}$$

PART I: Use the product property to solve each of the following. The first problem has already been solved for you.

1. $4^3 \times 4^2 = 4^5$
2. $2^5 \times 2^3 = 2^8$
3. $9^5 \times 9^5 = 9^{10}$
4. $3^3 \times 3^4 = 3^7$
5. $11^2 \times 11^{10} = 11^{12}$
6. $8^4 \times 8^8 = 8^{12}$
7. $5^9 \times 5^5 = 5^{14}$
8. $14^{19} \times 14^{11} = 14^{30}$
9. $6^{16} \times 6^6 = 6^{22}$
10. $10^{13} \times 10^{14} = 10^{27}$
11. $7^7 \times 7^{21} = 7^{28}$
12. $16^{24} \times 16^{19} = 16^{43}$

PART I: Use the product property to solve each of the following. The first problem has already been solved for you.

13. $x^3 \times x^7 = x^{10}$
14. $a^6 \times a^2 = a^8$
15. $y^3 \times y^3 = y^6$
16. $x^7 \times x^5 = x^{12}$
17. $b^{13} \times b^9 = b^{22}$
18. $m^{11} \times m^{15} = m^{26}$
19. $y^{20} \times y^{10} = y^{30}$
20. $s^{23} \times s^6 = s^{29}$
21. $x^{49} \times x^{51} = x^{100}$
22. $c^{33} \times c^{51} = c^{84}$
23. $j^9 \times j^{10} = j^{19}$
24. $w^{36} \times w^3 = w^{39}$

The Quotient Property

$$a^b \div a^c = a^{b-c} \quad \text{or} \quad \frac{a^b}{a^c} = a^{b-c}$$

PART I: Use the quotient property to solve each of the following. The first problem has already been solved for you.

1. $9^7 \div 9^5 =$ 9^2
2. $11^{12} \div 11^5 =$ 11^7
3. $\frac{5^7}{5^3} =$ 5^4
4. $2^{10} \div 2^1 =$ 2^9
5. $\frac{16^{21}}{16^{19}} =$ 16^2
6. $8^{24} \div 8^9 =$ 8^{15}
7. $\frac{17^{30}}{17^6} =$ 17^{24}
8. $15^{17} \div 15^7 =$ 15^{10}
9. $10^{28} \div 10^{16} =$ 10^{12}
10. $\frac{10^4}{10^2} =$ 10^2
11. $3^{50} \div 3^{27} =$ 3^{23}
12. $\frac{32^{40}}{32^{10}} =$ 32^{30}

PART II: Use the quotient property to solve each of the following. The first problem has already been solved for you.

13. $x^9 \div x^4 =$ x^5
14. $y^{16} \div y^6 =$ y^{10}
15. $\frac{k^{27}}{k^9} =$ k^{18}
16. $y^{39} \div y^{36} =$ y^3
17. $\frac{g^{50}}{g^{49}} =$ g^1
18. $m^{60} \div m^{40} =$ m^{20}
19. $\frac{p^{100}}{p^{64}} =$ p^{36}
20. $x^{29} \div x^7 =$ x^{22}
21. $y^{50} \div y^{25} =$ y^{25}
22. $\frac{w^{19}}{w^9} =$ w^{10}
23. $x^{88} \div x^{36} =$ x^{52}
24. $\frac{c^{19}}{c^2} =$ c^{17}

ıltiplying the number by itself three times is called **Cubing.**

ample: $2\times2\times2=8$.

ımber	Cube
	1
	8
	27
	64
	125

egative numbers cubed keep their negative sign.

- Example: $(-2)^3=-8$

worksheet (1).

ıbe Roots

ıbe root is the number which gives the original number when cubed.

xamples: $\sqrt[3]{27}=3$ and $\sqrt[3]{-8}=2$.

- Find the square of -8 $-8\times-8=64$
- Find $\sqrt{81}$ 9 OR -9
- Find the cube of -4. $-4\times-4\times-4=-64$

Identify the type of number:

Classify each number as **Natural (N), Integer (Z), or Rational (Q)**:

a) 7 (N) (Z) and (Q)

b) -12 (Z) and (Q)

c) 3/4 Q

d) 0.25 Q

e) 15 (N) (Z) (Q).

Fill in the blanks:

a) A number greater than 0 and without a fractional part is called a Natural.

b) Numbers that can be written in the form p/q, where p and q are integers are called Rational.

c) Numbers like -3, 0, 5 are Integers.

Convert into rational form:

Write the following numbers as fractions:

a) 0.6 ⟶ $\frac{6}{10}$ ⇒ $\frac{3}{5}$ (simplest form).

b) 2.75 ⟶ $2.75 = 2\frac{3}{4} = \frac{2\times4+3}{4} = \frac{8+3}{4} = \frac{11}{4}$

c) -5 ⟶ $\frac{-5}{1}$

Unit 1

Name: Answer key Lesson 3.1 Grade 7A

Date: _____ Multiplying and dividing by 0.1 and 0.01 Worksheet (2)

Objective(s): Use knowledge of place value to multiply and divide integers and decimals by 0.1 and 0.01.

Quick Rules for Students

- Multiply by 0.1 → divide by 10
- Multiply by 0.01 → divide by 100
- Divide by 0.1 → multiply by 10
- Divide by 0.01 → multiply by 100

Q1. Calculate the following.

a. 345×0.1 34.5

b. 12.6×0.01 0.126

c. 0.75×0.1 0.075

d. 9.08×0.01 0.0908

e. 480÷0.1 4800

f. 5.2÷0.01 520

g. 0.63÷0.1 6.3

h. 0.047÷0.01 4.7

Q2. Find the missing

a. 35 ×0.1=3.5

b. 8.24÷ 0.01 =824

c. 0.056× 0.01 =0.00056

d. 0.37 ÷0.01=37

Q3. Yara uses the formula E=0.1C, where E is the extra cost and C is the cost of an item.

- Work out the extra cost when C= $344.5

$E = 0.1 * C$
$0.1 * 344.5$
$344.5 \div 10$
$E = \$34.45$

Q4. A store charges a delivery fee equal to 0.01 of the cost of an order.

- If the order is $256, how much is the delivery fee?

0.01 of the cost.
$0.01 * 256$
$256 \div 100 = \$2.56$

Q5. A phone company charges 10% (which is 0.1) of the monthly bill as a late payment fee.

- If the bill is $82.50, how much is the late fee?

0.1 of the monthly bill
$0.1 * 82.50$
$82.50 \div 10 = \$8.25$

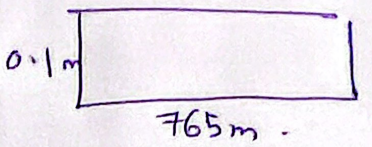
Q6. A school trip costs a total of $64. The teacher says that this is 0.1 of the total money collected from all students.

- How much money did the students collect in total?

$\$64 = 0.1$ of the total.
$64 = 0.1 * \text{total}$
$64 \div 0.1 \Rightarrow 64 \times 10 = \$640$

Q7. A rectangle has a width of 0.1 m and a length of 765 m.

- Find its area.



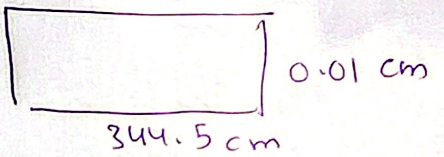
Area = length x width

765 x 0.1

765 ÷ 10 = 76.5 m^2

Q8. The length of a rectangle is 344.5 cm and its width is 0.01 cm.

- Work out its area.



Area = length x width

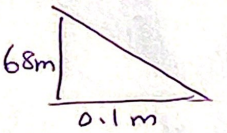
344.5 x 0.01

344.5 ÷ 100

3.445 cm^2.

Q9. A right-angled triangle has a base of 0.1 m and a height of 68 m.

- Find its area.



Area = $\frac{1}{2}$ x b x h

$\frac{1}{2}$ x 0.1 x 68 (34)

34 x 0.1

34 ÷ 10 = 3.4 m^2

Q10. A right-angled triangle has an area of 22.25 m^2 and a height of 0.1 m.

- Work out the base.

Area = $\frac{1}{2}$ x b x h

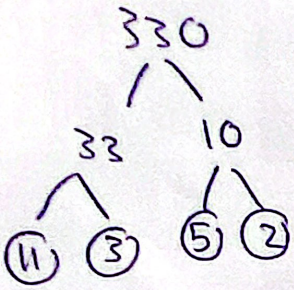
$2 \times (22.25) = \left(\frac{1}{2} \times 0.1 \times b\right) \times 2$

$\frac{44.50}{0.1} = \frac{0.1 \times b}{0.1}$

b = 44.50 ÷ 0.1

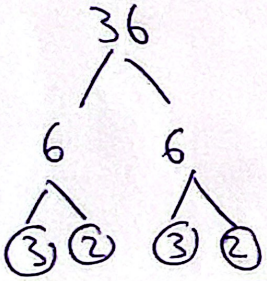
44.50 x 10 = 445 m.

Q1. Draw a factor tree for **330**, then write it as a product of prime factors.



$330 = 11 \times 3 \times 5 \times 2$.

Q2. Write 36^2 as a product of prime factors.



$36 = 2 \times 2 \times 3 \times 3$

$36 = 2^2 \times 3^2$

$36^2 = (2^2 \times 3^2)^2$

$36^2 = 2^4 \times 3^4$.

Q3. If $180 = 2^2 \times 3^2 \times 5$ and $54 = 2 \times 3^3$. Use these facts to find

a. The HCF of 180 and 54

$HCF = 2^1 \times 3^2 = 2 \times 9 = 18$.

b. The LCM of 180 and 54

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

$4 \times 27 \times 5$

20×27

540.

Q4. Work out

a. $(3+5) \times -4$

$8 \times -4 = -32$

b. $-6 \times (-2 + 7)$

$-6 \times 5 = -30$

Q5. Round the following to the nearest whole number to estimate the answer.

a. $(-6.1)^2$ $\quad (-6)^2 = -6 \times -6 = 36.$

b. -11.2×2.95 $\quad -11 \times 3 = -33$

Q6. Find the value of x.

a. $-15 \div x = 3$

$-15 \div 3 = -5$

So $x = -5$

b. $16 \div x = -2$

$16 \div -2 = -8$

So $x = -8$.