Student Book PYP

Oxford **Mathematics**

Primary Years Programme

6

Brian Murray

OXFORD

Oxford **Mathematics**

Primary Years Programme

6

Contents

NUMBER, PATTERN AND FUNCTION

MEASUREMENT, SHAPE AND SPACE

DATA HANDLING

OXFORD
UNIVERSITY PRESS
AUSTRALIA & NEW ZEALAND

Working with very large numbers

Large numbers have a gap between each set of three digits.

837452691 is easier to read if we write 837 452 691. It also makes it easier to say the number:

eight hundred and thirty-seven million, four hundred and fifty-two thousand, six hundred and ninety-one

Guided practice

1 Look at this number: 5 367 918

Show the value of each digit on the place-value grid.

Millions	Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones	Write the number using gaps if necessary
5	0	0	0	0	0	0	5 000 000

2 If we write nine hundred and five thousand, four hundred and seventy-six in digits, we use a zero to show there are no tens of thousands:

905 476

Remember to use a zero as a space-filler.

Write as digits:

a fifty-one thousand, six hundred and four _____

b two hundred thousand and twenty-six _____

c twelve thousand and ten _____

Independent practice

1 What is the value of the red digit?

a 463 290 _____

b 6 329 477 _____

c 2 406 219 _____

d 51 385 067 _____

e 80 487 003 _____

f 351 000 819 _____

2 Write the numbers from question 1 in words.

a _____

b _____

c _____

d _____

e _____

f _____

3 Write these numbers as digits.

a eighty million, four hundred and eighty-seven thousand

_____

b ten million, three hundred and sixty-two thousand and fifty-nine

_____

c one hundred and fourteen million, seven hundred and sixty thousand, two hundred and nine

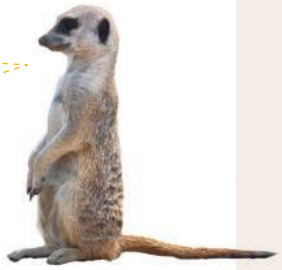
_____

d one billion, four hundred million, five hundred and ninety-three thousand and one

_____

4 Expand these numbers. The first one has been done for you.

Remember to use spaces between the digits where necessary.



a 374 596: 300 000 + 70 000 + 4000 + 500 + 90 + 6

b 214 867: 200 000 + _____

c 2 567 321: _____

d 5 673 207: _____

e 57 319 240: _____

f 407 508 004: _____

5 Look at these digit cards.

7	3	4	5	9	1	2

a What is the **largest** number that can be made using all the cards?

_____

b What is the **smallest** number that can be made if the digit "5" is in the millions place?

_____

c What is the **largest** number that can be made if the "7" is seven ones?

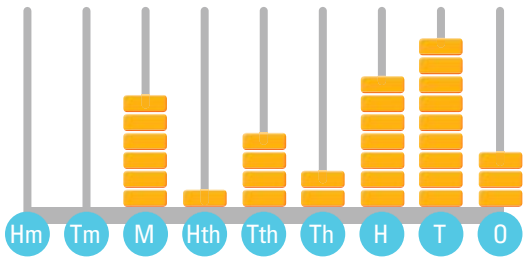
_____

d What is the **smallest** number that can be made if the "1" is in the tens of thousands place?

_____

6 Write the number shown on each spike abacus as digits and in words.

a

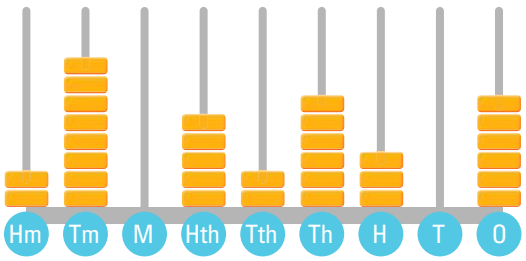


digits: _____

words: _____

_____

b



digits: _____

words: _____

_____

Extended practice

1 To change the calculator screen to show the second number, I would press:

a 24 550 _____ = 24 650

b 37 154 _____ = 77 154

c 739 255 _____ = 719 255

d 999 999 _____ = 1 000 000

2 Sometimes large numbers are abbreviated. $1K means $1000. $1.3M can be used for $1 300 000. Write the new price of these houses using digits **in full**.

a $345K reduced by $5000 _____

b $725K reduced by $20 000 _____

c $875K reduced by $50K _____

d $1.5M reduced by $250K _____

3 Imagine you have to choose just **one** digit in each of these numbers. Write:

- the digit you would choose
- the value of the digit
- the reason for your choice.

a A share of $574 612. _____

_____

b Writing out your times tables 574 612 times. _____

_____

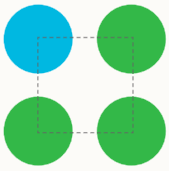
c Eating 574 612 of your favourite snack food in 10 minutes. _____

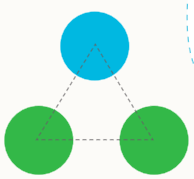
_____

Square numbers and triangular numbers

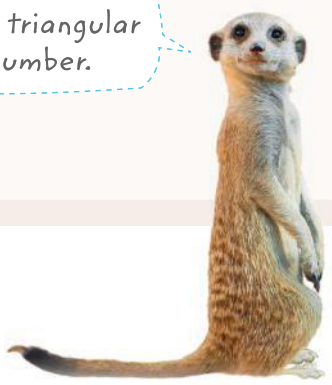
Numbers can be arranged in patterns

4 is a square number.





3 is a triangular number.



Guided practice

1 These are the first six square numbers. Fill in the gaps.

1

$1 \times 1 = 1^2$

$1^2 = 1$

4

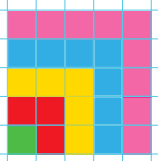
$2 \times 2 = 2^2$

$2^2 = 4$

9

$3 \times 3 = 3^2$

$4 \times 4 =$



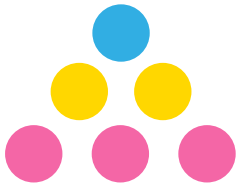
2 These are the first four triangular numbers. Fill in the gaps.

1

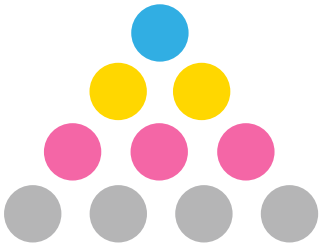
1

3

1 + 2 = 3

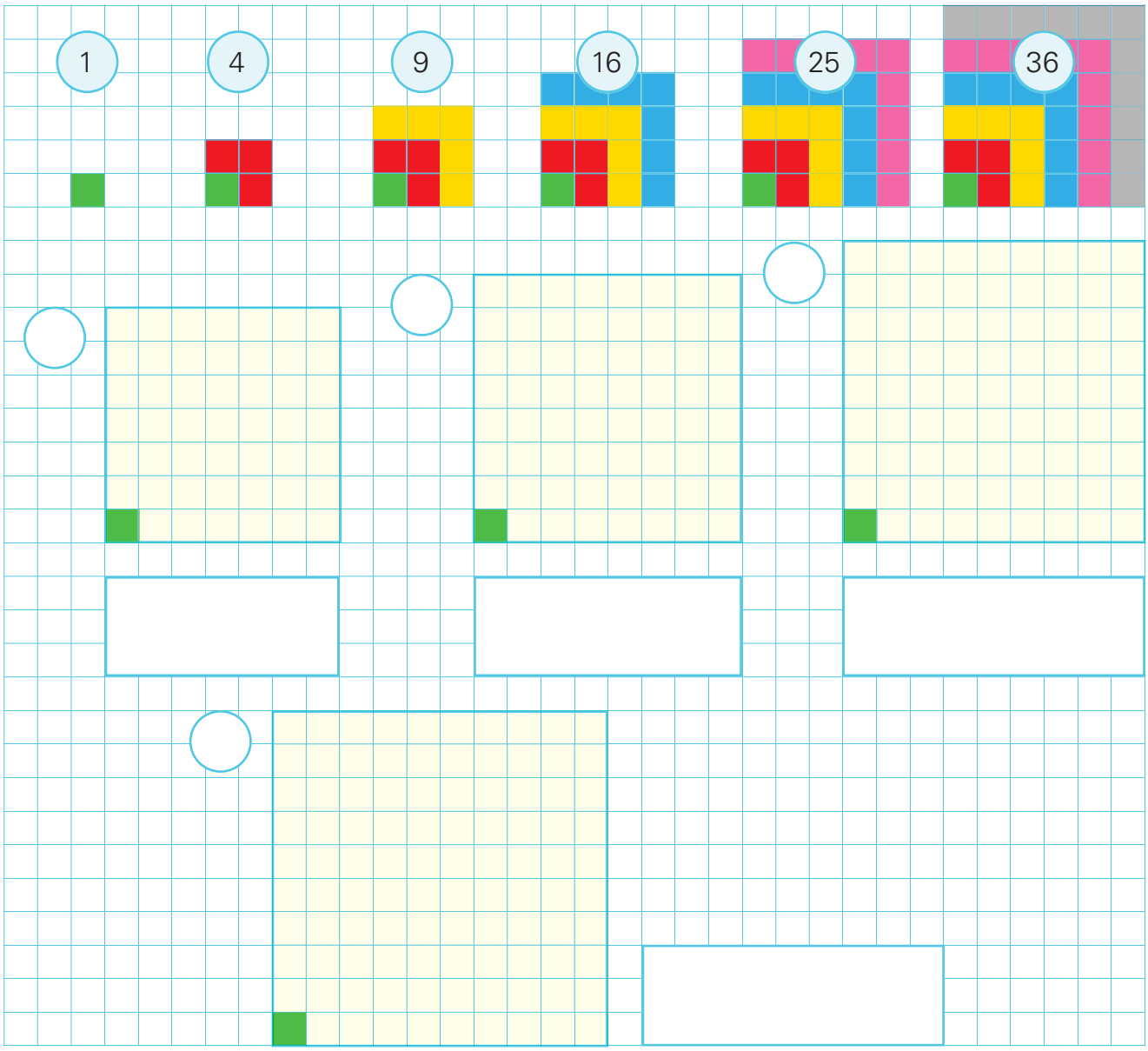


1 + 2 + 3 =



Independent practice

1 Complete the grid to show the first ten square numbers. Write the information as you did on page 10.



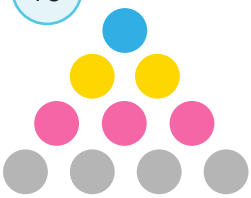
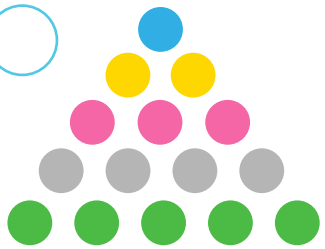
2 **a** What is the next number in the square number pattern? ☐

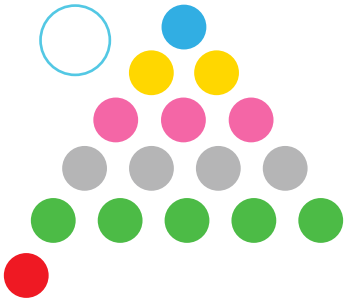
b How does the digit in the ones column change in the square number pattern?

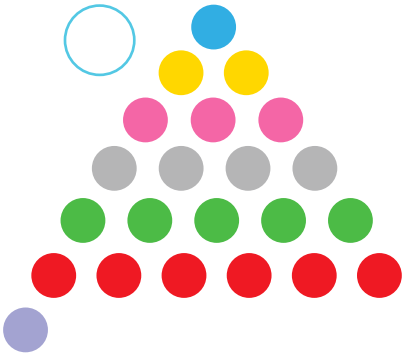
c Circle one answer. The 100th square number is:

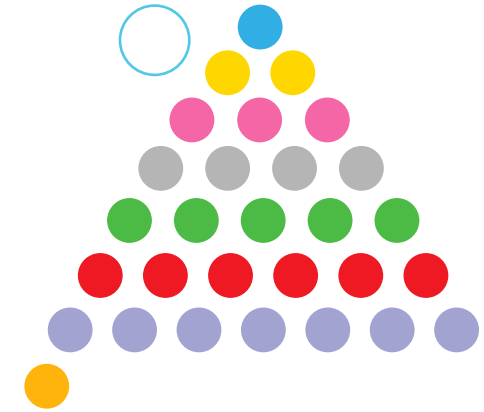
100 **1000** **10 000** **100 000**

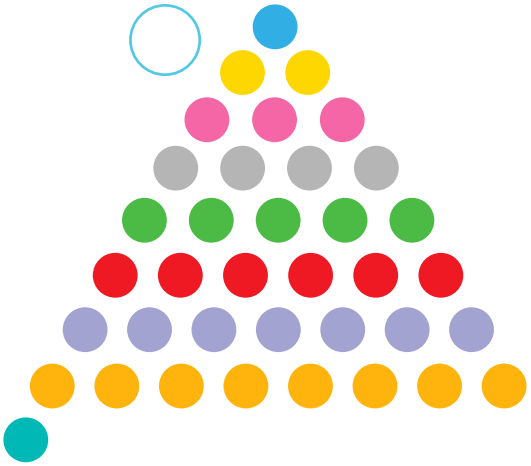
3 Complete the pattern and information to show the first 10 triangular numbers.

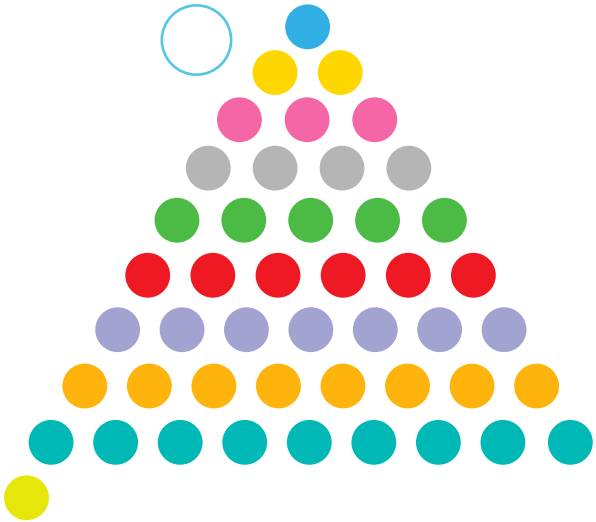
1	3	6	10	
				
1	1 + 2 = 3	1 + 2 + 3 = 6	1 + 2 + 3 + 4 = 10	1 + 2 +











4 **a** What is the 11th triangular number? ☐

b Apart from 1, which triangular number is also a square number? ☐

c How does the triangular number pattern grow? (Hint: Think about odd and even numbers.) _____

Extended practice

1 Continue this table.

Square number	Multiplication fact	Addition fact
$1^2 = 1$	$1 \times 1 = 1$	1
$2^2 = 4$	$2 \times 2 = 4$	$1 + 3 = 4$
$3^2 = 9$	$3 \times 3 = 9$	$1 + 3 + 5 = 9$
$4^2 =$		
$5^2 =$		
$6^2 =$		
$7^2 =$		
$8^2 =$		
$9^2 =$		
$10^2 =$		

2 **a** What do you notice about the way the addition facts grow in question 1?

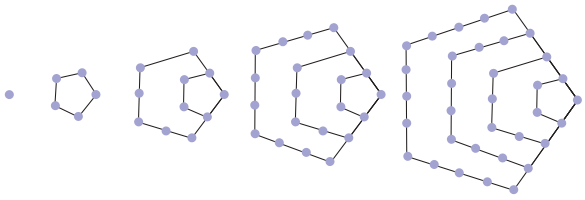
_____

b Write the facts for the 11th square number. _____

_____

c How many would you add to the 11th square number to find the 12th square number? _____

3 This pattern shows the first few pentagonal numbers.



a One of the numbers in this list is **not** a pentagonal number. Which number is it?

5, 12, 15, 22, 35	

b Write the first 5 pentagonal numbers. _____

c Write an explanation that would help a younger student to understand the connection between each pentagonal number and the one that follows it.

_____

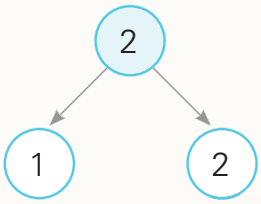
d On a separate piece of paper, draw a diagram of the 6th pentagonal number.

UNIT 1: TOPIC 3
Prime and composite numbers

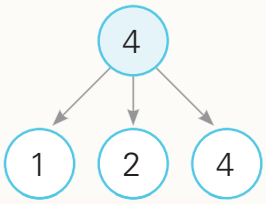
How do we recognise a prime number?

We say a number is *prime* if it has just two factors: 1 and itself. The number 2 is the smallest prime number because it can only be divided by 1 and 2. Numbers that have more than two factors are called *composite* numbers.

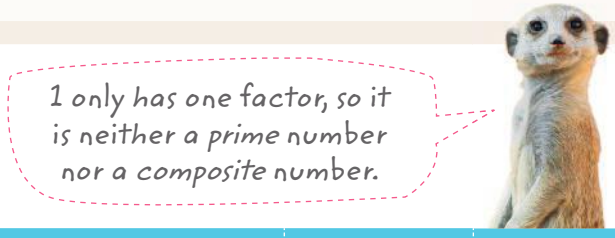
A prime number has just 2 factors.



A composite number has more than 2 factors.



Guided practice



1 Complete this chart.

Number	Factors (numbers it can be divided by)	How many factors?	Prime or composite?	
			Prime	Composite
1	1	1	neither	
2	1 and 2	2	✓	
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

2 **a** List the prime numbers between 2 and 20. _____

b Comment on the number of even prime numbers. _____

Independent practice

1 Follow these instructions to complete the grid. The grid has been started for you.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

a 1 is neither prime nor composite. Draw a star around it.

b 2 is a prime number. Circle it.

c Lightly shade all the multiples of 2. They are composite numbers.

d Put a circle around the next prime number: 3

e Lightly shade all the multiples of 3. They are composite numbers.

f Put a circle around the next prime number: 5

g Lightly shade all the multiples of 5. They are composite numbers.

h Find the **next** prime number. Circle it.

i Lightly shade all its multiples.

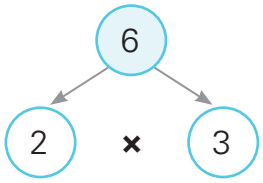
j Repeat Step h and Step i until you get to the end of the grid.

2 **a** The highest prime number on the grid is: ☐

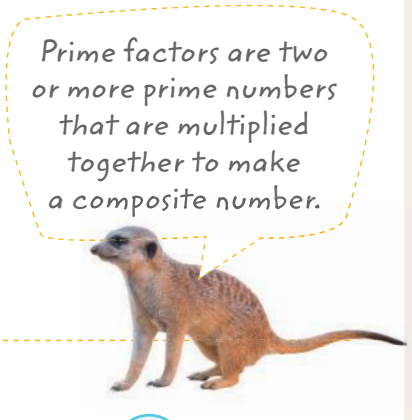
b True or false? All the prime numbers are odd. _____

c True or false? More of the composite numbers are even than odd. _____

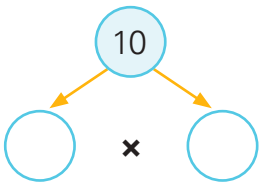
3 All composite numbers are made by multiplying prime numbers. 6 is a composite number. It can be made by multiplying 2 prime numbers: 2 × 3. We can show it in a factor tree:



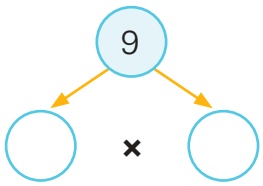
The prime factors of 6 are 2 and 3.
So 6 = 2 × 3



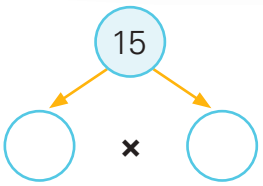
Fill in the gaps:



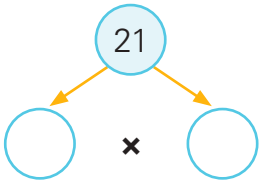
a The prime factors of 10 are _____.



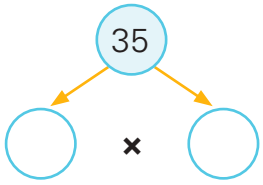
b The prime factors of 9 are _____.



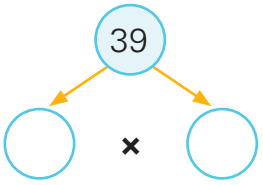
c The prime factors of 15 are _____.



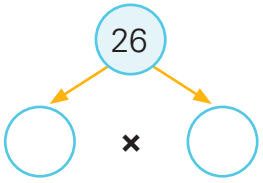
d The prime factors of 21 are _____.



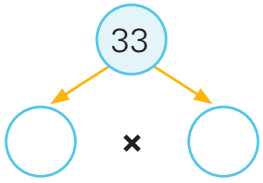
e The prime factors of 35 are _____.



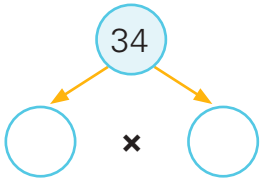
f The prime factors of 39 are _____.



g The prime factors of 26 are _____.



h The prime factors of 33 are _____.



i The prime factors of 34 are _____.

4 Draw factor trees for:

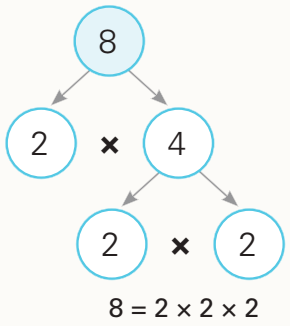
a 14

b 55

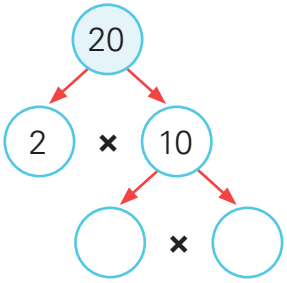
c 49

Extended practice

The prime factors of 8 are 2, 2 and 2. To show the prime factors of 8, we can write $2 \times 2 \times 2$. We can also write 2^3.

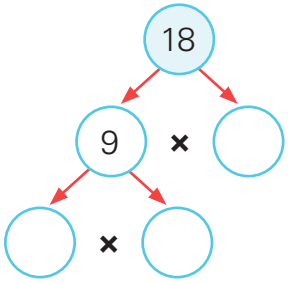


1 Fill in the gaps.



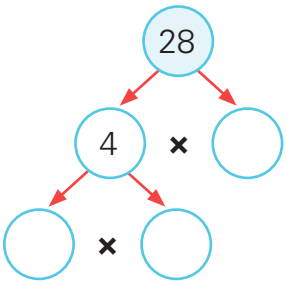
a $20 = 2 \times 2 \times$ ____

$20 = 2^{\square} \times$ ____



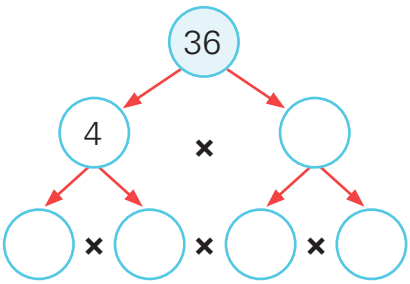
b $18 =$ ____ $\times$ ____ $\times$ ____

$18 =$ ____ $^{\square} \times$ ____



c $28 =$ ____ $\times$ ____ $\times$ ____

$28 =$ ____ $^{\square} \times$ ____



d $36 =$ ____ $\times$ ____ $\times$ ____ $\times$ ____

$36 =$ ____ $^{\square} \times$ ____ $^{\square}$

2 Draw factor trees to show the prime factors.

a 27

b 30

c 24