Investigating Square and Cube Numbers

(a) Write each of these square numbers as a product of its prime factors.

25	49	36
5×5	7×7	$2 \times 2 \times 3 \times 3$
100	81	225
$2 \times 2 \times 5 \times 5$	$3 \times 3 \times 3 \times 3$	$3 \times 3 \times 5 \times 5$

What do you notice?

All square numbers have matching pairs of prime factors

(b) Write each of these cube numbers as a product of its prime factors

125	64	1000
$5 \times 5 \times 5$	$2 \times 2 \times 2 \times 2 \times 2 \times 2$	$2 \times 2 \times 2 \times 5 \times 5 \times 5$

What do you notice?

All cube numbers have matching triples of prime factors

(c) By using what you have discovered, decide if each of these numbers is a square number, a cube number, both or neither.

324	512	441
$(2 \times 2) \times (3 \times 3) \times (3 \times 3)$ Square	$(2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (2 \times 2 \times 2)$ Cube	$(3 \times 3) \times (7 \times 7)$ Square
200	729	216
$2 \times 2 \times 2 \times 5 \times 5$ Neither	$(3 \times 3 \times 3) \times (3 \times 3 \times 3)$ Both	$(2 \times 2 \times 2) \times (3 \times 3 \times 3)$ Cube