1.9 Powers and Roots: 2-hour Pack

EDEXCEL 1MA1 · Calculator allowed · about 120 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Work out the value of $7^2 + 5^3$

(Total for Question 1 is 2 marks)

2 Work out $3^4 \times 2^2$

(Total for Question 2 is 2 marks)

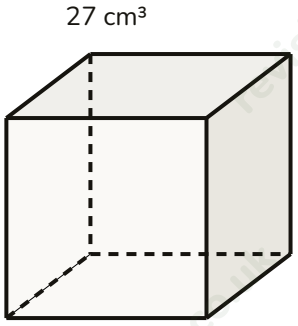
3 The value of $\sqrt{154}$ lies between two consecutive whole numbers. Write down the two whole numbers.

(Total for Question 3 is 2 marks)

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4 A cube has a volume of 27 cm³. Work out the total surface area of the cube.

Diagram NOT accurately drawn



(Total for Question 4 is 3 marks)

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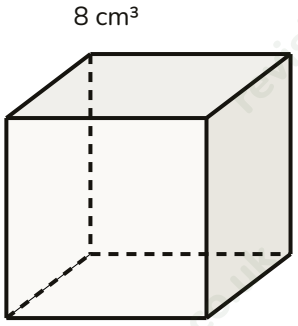
5 A square has a perimeter of 28 cm. Work out the area of the square.

(Total for Question 5 is 3 marks)

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6 A cube has a volume of 8 cm³. Work out the total surface area of the cube.

Diagram NOT accurately drawn



(Total for Question 6 is 3 marks)

---

7 Work out $4^2 \times 2^3$

(Total for Question 7 is 2 marks)

---

8 The value of $\sqrt{59}$ lies between two consecutive whole numbers. Write down the two whole numbers.

(Total for Question 8 is 2 marks)

---

9 Work out the value of $9^2 + 4^3$

(Total for Question 9 is 2 marks)

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10 A square has an area of 64 cm². Work out the perimeter of the square.

(Total for Question 10 is 3 marks)

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11 Work out the value of $2^2 + 2^3$

(Total for Question 11 is 2 marks)

---

12 Work out $2^3 \times 4^3$

(Total for Question 12 is 2 marks)

---

13 The value of $\sqrt{75}$ lies between two consecutive whole numbers. Write down the two whole numbers.

(Total for Question 13 is 2 marks)

---

14 A square has a perimeter of 32 cm. Work out the area of the square.

(Total for Question 14 is 3 marks)

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15 Work out $3^2 \times 2^3$

(Total for Question 15 is 2 marks)

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16 The value of $\sqrt{103}$ lies between two consecutive whole numbers. Write down the two whole numbers.

(Total for Question 16 is 2 marks)

---

17 A square has an area of 36 cm². Work out the perimeter of the square.

(Total for Question 17 is 3 marks)

---

18 Work out $2^2 \times 5^2$

(Total for Question 18 is 2 marks)

---

19 The value of $\sqrt{98}$ lies between two consecutive whole numbers. Write down the two whole numbers.

(Total for Question 19 is 2 marks)

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20 A square has an area of 196 cm². Work out the perimeter of the square.

(Total for Question 20 is 3 marks)

---

21 Work out $5^2 \times 2^3$

(Total for Question 21 is 2 marks)

---

22 The value of $\sqrt{43}$ lies between two consecutive whole numbers. Write down the two whole numbers.

(Total for Question 22 is 2 marks)

---

23 A square has an area of 25 cm². Work out the perimeter of the square.

(Total for Question 23 is 3 marks)

---

24 The value of $\sqrt{126}$ lies between two consecutive whole numbers. Write down the two whole numbers.

(Total for Question 24 is 2 marks)

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25 The value of $\sqrt{176}$ lies between two consecutive whole numbers. Write down the two whole numbers.

(Total for Question 25 is 2 marks)

---

26 Work out $5^4 \times 3^3$

(Total for Question 26 is 2 marks)

---

27 The value of $\sqrt{63}$ lies between two consecutive whole numbers. Write down the two whole numbers.

(Total for Question 27 is 2 marks)

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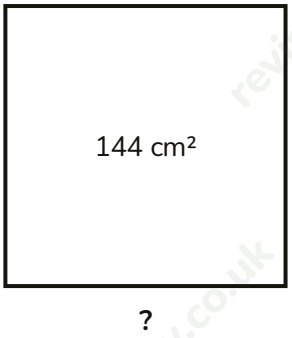
28 Work out $3^3 \times 2^3$

(Total for Question 28 is 2 marks)

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29 A square rug has an area of 144 cm². Work out the length of one side of the rug.

Diagram NOT accurately drawn



(Total for Question 29 is 2 marks)

---

30 Look carefully at the brackets in each calculation.

(a) Work out $(-6)^2$ **(1)**

.....

(b) Work out -6^2 **(1)**

.....

(Total for Question 30 is 2 marks)

---

31 Work out each cube root.

(a) $\sqrt[3]{-27}$ **(1)**

.....

(b) $\sqrt[3]{-1000}$ **(1)**

.....

(Total for Question 31 is 2 marks)

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32 Work out 2^5.

(Total for Question 32 is 1 mark)

33 Work out 2^0.

(Total for Question 33 is 1 mark)

34 Work out 3^4.

(Total for Question 34 is 1 mark)

35 Work out $9^{1/2}$.

(Total for Question 35 is 1 mark)

36 Work out the value of each expression.

(a) Work out $(-7)^0$. **(1)**

(b) Work out 2^{-3}, giving your answer as a fraction. **(1)**

(Total for Question 36 is 2 marks)

37 The area of a square is 256 cm². Work out the length of one side in cm.

(Total for Question 37 is 2 marks)

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38 Simplify $7^4 \times 7^{-2}$. Give your answer as a single power of 7.

(Total for Question 38 is 2 marks)

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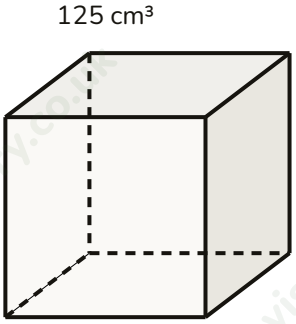
39 Simplify $5^6 / 5^9$. Give your answer as a fraction.

(Total for Question 39 is 2 marks)

---

40 A storage box for a school science kit in Bristol is a cube with volume 125 cm³. Work out the length of one edge of the box.

Diagram NOT accurately drawn



(Total for Question 40 is 2 marks)

---

41 Simplify $\sqrt{180}$ giving your answer in simplest form.

(Total for Question 41 is 2 marks)

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42 Simplify $(2^3 \times 2^5) / 2^4$, giving your answer as an ordinary number.

(Total for Question 42 is 2 marks)

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43 Work out the value of $8^{2/3}$.

(Total for Question 43 is 2 marks)

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Mark scheme · 1.9 Powers and Roots: 2-hour Pack

A correct answer earns full marks unless the question asks for working, a method, proof or explanation.

Question 1

49 or 125 seen	**M1**
174 cao	**A1**

Answer: 174

Question 2

81 or 4 seen	**M1**
324 cao	**A1**

Answer: 324

Question 3

$12^2 = 144$ or $13^2 = 169$ seen	**M1**
12 and 13	**A1**

Answer: 12 and 13

Question 4

cube root of 27 or 3 seen	**M1**
6 x 3^2	**M1**
54 cm² cao	**A1**

Answer: 54 cm^2

Question 5

28 / 4 or 7 seen	**M1**
7 x 7	**M1**
49 cm² cao	**A1**

Answer: 49 cm^2

Question 6

cube root of 8 or 2 seen	**M1**
6 x 2^2	**M1**
24 cm² cao	**A1**

Answer: 24 cm^2

Question 7

16 or 8 seen	**M1**
128 cao	**A1**

Answer: 128

Question 8

$7^2 = 49$ or $8^2 = 64$ seen	**M1**
7 and 8	**A1**

Answer: 7 and 8

Question 9

81 or 64 seen	**M1**
145 cao	**A1**

Answer: 145

Question 10

$\sqrt{64}$ or 8 seen	**M1**
4 x 8	**M1**
32 cm cao	**A1**

Answer: 32 cm

Question 11

4 or 8 seen	**M1**
12 cao	**A1**

Answer: 12

Question 12

8 or 64 seen	**M1**
512 cao	**A1**

Answer: 512

Question 13

$8^2 = 64$ or $9^2 = 81$ seen	**M1**
8 and 9	**A1**

Answer: 8 and 9

Question 14

32 / 4 or 8 seen	**M1**
8 x 8	**M1**
64 cm² cao	**A1**

Answer: 64 cm^2

Question 15

9 or 8 seen	**M1**
72 cao	**A1**

Answer: 72

Question 16

$10^2 = 100$ or $11^2 = 121$ seen	**M1**
10 and 11	**A1**

Answer: 10 and 11

Question 17

$\sqrt{36}$ or 6 seen	**M1**
4 x 6	**M1**
24 cm cao	**A1**

Answer: 24 cm

Question 18

4 or 25 seen	**M1**
100 cao	**A1**

Answer: 100

Question 19

$9^2 = 81$ or $10^2 = 100$ seen	**M1**
9 and 10	**A1**

Answer: 9 and 10

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Question 20

$\sqrt{196}$ or 14 seen **M1**

4 x 14 **M1**

56 cm cao **A1**

Answer: 56 cm

Question 21

25 or 8 seen **M1**

200 cao **A1**

Answer: 200

Question 22

$6^2 = 36$ or $7^2 = 49$ seen **M1**

6 and 7 **A1**

Answer: 6 and 7

Question 23

$\sqrt{25}$ or 5 seen **M1**

4 x 5 **M1**

20 cm cao **A1**

Answer: 20 cm

Question 24

$11^2 = 121$ or $12^2 = 144$ seen **M1**

11 and 12 **A1**

Answer: 11 and 12

Question 25

$13^2 = 169$ or $14^2 = 196$ seen **M1**

13 and 14 **A1**

Answer: 13 and 14

Question 26

625 or 27 seen **M1**

16875 cao **A1**

Answer: 16875

Question 27

$7^2 = 49$ or $8^2 = 64$ seen **M1**

7 and 8 **A1**

Answer: 7 and 8

Question 28

27 or 8 seen **M1**

216 cao **A1**

Answer: 216

Question 29

$\sqrt{144}$ seen or correct method to find the side length **M1**

12 cm cao (units required) **A1**

Answer: 12 cm

Question 30

(a) 36 cao **B1**

(a) Answer: 36

(b) -36 cao (the power applies to 6 only, then negate) **B1**

(b) Answer: -36

Question 31

(a) -3 cao **B1**

(a) Answer: -3

(b) -10 cao **B1**

(b) Answer: -10

Question 32

32 cao **B1**

Answer:32

($2^5 = 32$).

Question 33

1 cao **B1**

Answer:1

(any non-zero number to the power 0 equals 1).

Question 34

81 cao **B1**

Answer: 81

Question 35

3 cao **B1**

Answer: 3

Question 36

(a) 1 cao **B1**

(a) Answer: 1

(b) 1/8 oe cao **B1**

(b) Answer: 1/8

Question 37

take square root of 256 to find side length **M1**

16 cm cao **A1**

Answer:16 cm

(side = $\sqrt{256}$ = 16 cm).

Question 38

use index law: add powers ($7^4 \times 7^{-2} = 7^{4 + -2}$) **M1**

7^2 cao **A1**

Answer: 7^2

Question 39

use index law: subtract powers to get $5^{6-9} = 5^{-3}$ **M1**

1/125 oe (5^{-3}) cao **A1**

Answer: 1/125

Question 40

take the cube root of 125 to find the edge length **M1**

5 cm cao **A1**

Answer: 5 cm

Question 41

factor 180 as 36 x 5 and take square root of square factor **M1**

$6\sqrt{5}$ cao **A1**

Answer:$6\sqrt{5}$

($\sqrt{180} = \sqrt{36 \times 5} = 6\sqrt{5}$).

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Question 42

use index laws to combine to a single power of 2 ($2^{3+5-4} = 2^4$) **M1**

16 cao **A1**

Answer: 16

Question 43

find the cube root of 8, i.e. use $8^{1/3} = 2$ **M1**

4 cao **A1**

Answer: 4

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