



KS3.M-N15 Roots, Powers and Exact Values

AQA KS3.M-N15 · Calculators not allowed · about 60 minutes

Name: _____ Date: ____ / ____ / ____

Answer ALL questions. Show all your working.

1 Evaluate each exact root value.

(a) $\sqrt{81}$ (1)

(b) cube root of 27 _____ (1)

(c) $\sqrt{49}$ _____ (1)

2 Find each exact power.

(a) 7^2 _____ (1)

(b) 4^3 _____ (1)

3 Simplify the surd $\sqrt{50}$ and give the answer in simplest exact form.

(2)

4 Simplify $\sqrt{72}$ giving the exact form $a\sqrt{b}$ with b simplified.

(2)

5 Simplify $\sqrt{18}$ and give your answer in simplest exact form.

(2)

6 Simplify $\sqrt{8}$ in exact form.

(2)

7 Write $\sqrt{45}$ in the form $a\sqrt{b}$ with b simplified.

(2)

8 Give the exact values.

(a) $(\sqrt{3})^2$ (1)

(b) $\sqrt{5} \times \sqrt{5}$ (1)

9 Find each cube root exactly.

(a) cube root of 64

(1)

(b) cube root of 216

(1)

10 Evaluate the powers exactly.

(a) 2^5

(1)

(b) 5^3

(1)

11 Work out $\sqrt{2} \times \sqrt{8}$ and give the answer in exact form.

(2)

12 Multiply the surds and simplify: $\sqrt{3} \times \sqrt{12}$.

(2)

13 Simplify and combine: $\sqrt{20} + \sqrt{5}$. Give the exact form.

(2)

14 Give the positive square root of 49.

(1)

- 15** Without using a calculator, state whether $\sqrt{50}$ is greater than, equal to or less than 7. Give a brief reason.

(1)

-
- 16** Simplify $(\sqrt{5})^3$ and give the exact form.

(2)

-
- 17** A square garden has area 50 m^2 . Find the exact length of one side in simplest surd form.

(2)

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- 18** Stretch: Express $\sqrt{12} + \sqrt{27}$ in the form $k\sqrt{3}$. Find k and show the steps.

(2)

Mark scheme • KS3.M-N15 Roots, Powers and Exact Values

Question 1

- (a) **B1** 9 cao
- (a) Answer: **9**
- (b) **B1** 3 cao
- (b) Answer: **3**
- (c) **B1** 7 cao
- (c) Answer: **7**

Question 2

- (a) **B1** 49 cao
- (a) Answer: **49**
- (b) **B1** 64 cao
- (b) Answer: **64**

Question 3

- **M1** factor 50 as 25×2 or identify largest square factor
- **A1** $5\sqrt{2}$ cao
- Answer: **$5\sqrt{2}$**

Question 4

- **M1** factor 72 as 36×2 or identify 36 as largest square factor
- **A1** $6\sqrt{2}$ cao
- Answer: **$6\sqrt{2}$**

Question 5

- **M1** factor 18 as 9×2 or identify 9 as largest square factor
- **A1** $3\sqrt{2}$ cao
- Answer: **$3\sqrt{2}$**

Question 6

- **M1** factor 8 as 4×2 or identify 4 as largest square factor
- **A1** $2\sqrt{2}$ cao
- Answer: **$2\sqrt{2}$**

Question 7

- **M1** factor 45 as 9×5 or identify 9 as largest square factor
- **A1** $3\sqrt{5}$ cao
- Answer: **$3\sqrt{5}$**

Question 8

- (a) **B1** 3 cao
- (a) Answer: **3**
- (b) **B1** 5 cao
- (b) Answer: **5**

Question 9

- (a) **B1** 4 cao
- (a) Answer: **4**
- (b) **B1** 6 cao
- (b) Answer: **6**

Question 10

- (a) **B1** 32 cao
- (a) Answer: **32**
- (b) **B1** 125 cao
- (b) Answer: **125**

Question 11

- **M1** use property $\sqrt{a} \times \sqrt{b} = \sqrt{ab}$ or simplify $\sqrt{8}$
- **A1** 4 cao
- Answer: **4**

Question 12

- **M1** use $\sqrt{3} \times \sqrt{12} = \sqrt{36}$ or simplify $\sqrt{12}$ to $2\sqrt{3}$
- **A1** 6 cao
- Answer: **6**

Question 13

- **M1** simplify $\sqrt{20}$ to $2\sqrt{5}$ or show common surd factor
- **A1** $3\sqrt{5}$ cao
- Answer: **$3\sqrt{5}$**

Question 14

- **B1** 7 cao
- Answer: **7**

Question 15

- **B1** answer: greater than 7 with reason such as $50 > 49$ so $\sqrt{50} > \sqrt{49} = 7$
- Answer: **Greater than 7**

Question 16

- **M1** recognise $(\sqrt{5})^3 = (\sqrt{5})^2 \times \sqrt{5}$ or $5 \times \sqrt{5}$
- **A1** $5\sqrt{5}$ cao
- Answer: **$5\sqrt{5}$**

Question 17

- **M1** use side = $\sqrt{\text{area}}$ or write side = $\sqrt{50}$
- **A1** $5\sqrt{2}$ m cao
- Answer: **$5\sqrt{2}$ m**

Question 18

- **M1** simplify each surd: $\sqrt{12} = 2\sqrt{3}$, $\sqrt{27} = 3\sqrt{3}$ or equivalent
- **A1** $5\sqrt{3}$ cao so $k = 5$
- Answer: **$5\sqrt{3}$**