MASTER MATHS GCSE

## GCSE Mathematics 9-1

# Powers and Roots

(Non-Calculator)

**Mark Scheme**

**Total available marks: 62**

| Q | Answer | Working | Mark |
|---|---|---|---|
| **1** | *4 or 9*<br>*e.g.* 9 | $4 = 2 \times 2$ and $9 = 3 \times 3$ | 1 |
| **2** | 16 | $16 = 4 \times 4$ | 1 |
| **3** | 1, 25, 36, 49 | $1 = 1^2$, $25 = 5^2$, $36 = 6^2$, $49 = 7^2$<br>(1 mark for three correct with no wrong ones) | 2 |
| **4** | 8 and 27 | $8 = 2 \times 2 \times 2$<br>$27 = 3 \times 3 \times 3$<br>(1 mark for each) | 2 |
| **5** | 1, 4, 9, 16, 25 | $1^2$, $2^2$, $3^2$, $4^2$, $5^2$ | 1 |
| **6** | 1, 8, 27, 64 | $1 \times 1 \times 1$, $2 \times 2 \times 2$, $3 \times 3 \times 3$, $4 \times 4 \times 4$ | 1 |
| **7(a)** | *9, 36 or 100*<br>*e.g.* 36 | $9 = 3^2$, $36 = 6^2$, $100 = 10^2$ | 1 |
| **7(b)** | 27 | $27 = 3 \times 3 \times 3$, and 27 is not a square number | 1 |
| **7(c)** | 64 | $64 = 8^2$ and $64 = 4 \times 4 \times 4$ | 1 |
| **8(a)** | 36 | $6 \times 6$ | 1 |
| **8(b)** | 81 | $9 \times 9$ | 1 |
| **8(c)** | 121 | $11 \times 11$ | 1 |
| **8(d)** | 1 | $1 \times 1$ | 1 |
| **9(a)** | 9 | $3 \times 3$ | 1 |
| **9(b)** | 100 | $10 \times 10$ | 1 |
| **9(c)** | 144 | $12 \times 12$ | 1 |
| **10** | 400 | $20 \times 20 = 400$ | 1 |
| **11** | 34 | $5^2 = 25$ and $3^2 = 9$<br>$25 + 9 = 34$ | 2 |
| **12** | 48 | $8^2 = 64$ and $4^2 = 16$<br>$64 - 16 = 48$ | 2 |

| Q | Answer | Working | Mark |
|---|---|---|---|
| **13** | 36 | $2^2 = 4$ and $3^2 = 9$<br>$4 \times 9 = 36$ | 2 |
| **14(a)** | 7 | $7 \times 7 = 49$ | 1 |
| **14(b)** | 10 | $10 \times 10 = 100$ | 1 |
| **14(c)** | 1 | $1 \times 1 = 1$ | 1 |
| **14(d)** | 12 | $12 \times 12 = 144$ | 1 |
| **15(a)** | 4 | $4 \times 4 = 16$ | 1 |
| **15(b)** | 9 | $9 \times 9 = 81$ | 1 |
| **15(c)** | 11 | $11 \times 11 = 121$ | 1 |
| **16(a)** | 2 | $2 \times 2 \times 2 = 8$ | 1 |
| **16(b)** | 3 | $3 \times 3 \times 3 = 27$ | 1 |
| **16(c)** | 10 | $10 \times 10 \times 10 = 1000$ | 1 |
| **17** | 14 | $\sqrt{36} = 6$ and $\sqrt{64} = 8$<br>$6 + 8 = 14$ | 2 |
| **18** | 10 | $\sqrt{25} = 5$ and $\sqrt{4} = 2$<br>$5 \times 2 = 10$ | 2 |
| **19** | 7 | $\sqrt{100} = 10$ and $\sqrt{9} = 3$<br>$10 - 3 = 7$ | 2 |
| **20** | 7 | $7 \times 7 = 49$ | 1 |
| **21** | 36 | $6 \times 6 = 36$, so $\sqrt{36} = 6$ | 1 |
| **22** | 12 | $12 \times 12 = 144$ | 1 |
| **23** | $2^2$, $\sqrt{64}$, $3^2$, $\sqrt{100}$ | Work out each one: $3^2 = 9$, $\sqrt{64} = 8$, $2^2 = 4$, $\sqrt{100} = 10$<br>$4 < 8 < 9 < 10$ | 2 |
| **24** | $\sqrt{400}$ | $4^2 = 16$<br>$\sqrt{400} = 20$ (because $20 \times 20 = 400$)<br>$20 > 16$ | 2 |

| Q | Answer | Working | Mark |
|---|---|---|---|
| **25** | No, $7^2 = 49$ and $8^2 = 64$, so 50 is not a square number | 49 and 64 are square numbers next to each other, and 50 is between them | 1 |
| **26** | No, $3^2$ means $3 \times 3$, which is 9 (not $3 \times 2$) | $3^2 = 3 \times 3 = 9$ | 1 |
| **27** | 64 | $7^2 = 49$, $8^2 = 64$, $9^2 = 81$<br>Only 64 is between 50 and 70 | 1 |
| **28** | 25 | Square numbers between 20 and 40: 25 and 36<br>25 is odd | 1 |
| **29** | 25 and 36 | Square numbers greater than 10: 16, 25, 36, 49<br>Try pairs that add to 61: $25 + 36 = 61$ | 2 |
| **30** | 8 and 27 | Cube numbers: 1, 8, 27, 64<br>$8 + 27 = 35$ | 2 |
| **31** | 64 tiles | 8 rows of 8 tiles<br>$8^2 = 8 \times 8 = 64$ | 2 |
| **32** | 9 m | Area of a square = side × side<br>$\sqrt{81} = 9$, because $9 \times 9 = 81$ | 2 |
| **33** | 6 | Work backwards: $41 - 5 = 36$<br>$\sqrt{36} = 6$ | 2 |

| **Total available marks for this paper** | **62** |
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