



ACHIEVE ACADEMY

GCSE Maths — Higher Tier

Factors, Multiples, Primes & Indices · Practice Booklet

NAME: _____

CLASS: _____

DATE: _____

☐ Developing

☒ Secure

☐ Greater Depth

Answer every question in the working space provided. Method marks are available for correct working even if the final answer is wrong. Check the time allowed with your tutor before you start.

Factors, Multiples, Primes & Indices

Total marks available: 100

● Factors, Multiples, Primes & Indices

✓4

Q1 · ● Developing · 3 marks

METHOD

$16^{1/2}$ means the 2nd root of 16, which is 4

✓3⁴

Q2 · ● Developing · 3 marks

METHOD

Power of a power: multiply the indices: $2 \times 2 = 4$

✓2³

Q3 · ● Developing · 3 marks

METHOD

Add the multiplied indices, then subtract: $5 + 2 - 4 = 3$

✓9

Q4 · ● Developing · 3 marks

METHOD

$27^{2/3} = (27^{1/3})^2 = 3^2 = 9$

✓4

Q5 · ● Developing · 3 marks

METHOD

$64^{1/3}$ means the 3rd root of 64, which is 4

✓2⁸

Q6 · ● Developing · 3 marks

METHOD

Power of a power: multiply the indices: $4 \times 2 = 8$

$\checkmark 2^2$

Q7 · ● Developing · 3 marks

METHOD

Add the multiplied indices, then subtract: $3 + 3 - 4 = 2$

$\checkmark 3^6$

Q8 · ● Developing · 3 marks

METHOD

Add the multiplied indices, then subtract: $8 + 2 - 4 = 6$

$\checkmark 8$

Q9 · ● Developing · 3 marks

METHOD

$$4^{3/2} = (4^{1/2})^3 = 2^3 = 8$$

$\checkmark 3^8$

Q10 · ● Developing · 3 marks

METHOD

Power of a power: multiply the indices: $2 \times 4 = 8$

$\checkmark 12 \times 3^5$

Q11 · ● Secure · 3 marks

METHOD

Multiply the coefficients: $3 \times 4 = 12$

Add the indices: $3 + 2 = 5$

$\checkmark 8 \text{ pens of each colour per bag}$

Q12 · ● Secure · 3 marks

METHOD

This is the HCF of 40 and 32.

$$\text{HCF}(40, 32) = 8$$

$$\sqrt{16} \times 2^5$$

Q13 · ● Secure · 3 marks

METHOD

Multiply the coefficients: $4 \times 4 = 16$

Add the indices: $2 + 3 = 5$

$$\sqrt{12} \times 2^6$$

Q14 · ● Secure · 3 marks

METHOD

Multiply the coefficients: $4 \times 3 = 12$

Add the indices: $3 + 3 = 6$

$$\sqrt{12} \times 5^6$$

Q15 · ● Secure · 3 marks

METHOD

Multiply the coefficients: $4 \times 3 = 12$

Add the indices: $4 + 2 = 6$

$$\sqrt{6} \times 3^5$$

Q16 · ● Secure · 3 marks

METHOD

Multiply the coefficients: $3 \times 2 = 6$

Add the indices: $4 + 1 = 5$

$$\sqrt{16} \times 5^8$$

Q17 · ● Secure · 3 marks

METHOD

Multiply the coefficients: $4 \times 4 = 16$

Add the indices: $5 + 3 = 8$

✓ 6 pens of each colour per bag

Q18 · ● Secure · 3 marks

METHOD

This is the HCF of 42 and 60.

$$\text{HCF}(42, 60) = 6$$

✓ 4×2^3

Q19 · ● Secure · 3 marks

METHOD

Multiply the coefficients: $2 \times 2 = 4$

Add the indices: $2 + 1 = 3$

✓ 12×3^8

Q20 · ● Secure · 3 marks

METHOD

Multiply the coefficients: $4 \times 3 = 12$

Add the indices: $4 + 4 = 8$

✓ $1/4$

Q21 · ● Greater Depth · 4 marks

METHOD

$$8^{-2/3} = 1 \div 8^{2/3}$$

$$8^{2/3} = 4$$

So the answer is $1/4$

✓ $1/2$

Q22 · ● Greater Depth · 4 marks

METHOD

$$4^{-1/2} = 1 \div 4^{1/2}$$

$$4^{1/2} = 2$$

So the answer is $1/2$

$$\sqrt{5^3 \times 7^2}$$

Q23 · ● Greater Depth · 4 marks

METHOD

LCM uses the highest power of each prime present:
 $7^{\max(2,1)} \times 5^{\max(3,3)} = 7^2 \times 5^3$

$$\sqrt{1/3}$$

Q24 · ● Greater Depth · 4 marks

METHOD

$$27^{-1/3} = 1 \div 27^{1/3}$$

$$27^{1/3} = 3$$

So the answer is $1/3$

$$\sqrt{3^3 \times 5}$$

Q25 · ● Greater Depth · 4 marks

METHOD

LCM uses the highest power of each prime present:
 $3^{\max(2,3)} \times 5^{\max(1,1)} = 3^3 \times 5^1$

$$\sqrt{2^3 \times 7^3}$$

Q26 · ● Greater Depth · 4 marks

METHOD

LCM uses the highest power of each prime present:
 $2^{\max(3,1)} \times 7^{\max(3,2)} = 2^3 \times 7^3$

$$\sqrt{1/9}$$

Q27 · ● Greater Depth · 4 marks

METHOD

$$27^{-2/3} = 1 \div 27^{2/3}$$

$$27^{2/3} = 9$$

So the answer is $1/9$

$$\sqrt{2^2 \times 7}$$

Q28 · ● Greater Depth · 4 marks

METHOD

HCF uses the lowest power of each common prime:

$$2^{\min(2,2)} \times 7^{\min(1,1)} = 2^2 \times 7^1$$

$$\sqrt{3 \times 7^2}$$

Q29 · ● Greater Depth · 4 marks

METHOD

HCF uses the lowest power of each common prime:

$$3^{\min(3,1)} \times 7^{\min(2,2)} = 3^1 \times 7^2$$

$$\sqrt{1/4}$$

Q30 · ● Greater Depth · 4 marks

METHOD

$$16^{-1/2} = 1 \div 16^{1/2}$$

$$16^{1/2} = 4$$

So the answer is $1/4$