4.2 Indices: 30-minute Pack

EDEXCEL 1MA1 · Calculator allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

Index Laws Checklist

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Multiplying powers of the same base: add the indices, a^m * a^n = a^(m+n). Dividing powers of the same base: subtract the indices, a^m / a^n = a^(m-n). Raising a power to a power: multiply the indices, (a^m)^n = a^(m*n). Any non-zero number to the power 0 is 1: a^0 = 1. A negative index gives a reciprocal: a^-n = 1/a^n. A fractional index gives a root: a^(1/n) = nth root of a, and more generally a^(m/n) = (nth root of a)^m. Work through the fluency questions first to build speed with these rules, then use the exam-style questions to practise applying them in longer, marked problems.

1 Work out the value of 3^4.

(Total for Question 1 is 1 mark)

2 Simplify $6^2 \div 6^1$.

(Total for Question 2 is 3 marks)

3 Simplify $4a^5c^5 \times 2a^2c^6$

(Total for Question 3 is 2 marks)

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4 Find the value of n.
$(2^n)^3 = 2^{15}$

(Total for Question 4 is 2 marks)

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5 Write as a single power: $3^2 \times 3^3$.

(Total for Question 5 is 4 marks)

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6 Work out and simplify fully: $(2^3 \times 2^2) \div 2^4$.

(a) Simplify inside the brackets first. **(3)**

(b) Now divide by 2^4 and give the final answer as a power of 2 and as a whole number. **(6)**

(Total for Question 6 is 9 marks)

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7 Solve $2^x = 32$.

(Total for Question 7 is 2 marks)

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Mark scheme · 4.2 Indices: 30-minute Pack

Question 1

81 cao	**B1**

Answer: 81

Question 2

use law $6^2 \div 6^1 = 6^{2-1}$ or show $36 \div 6$	**M1**
6 cao	**A1**
accept explanation using index rule	**B1**

Answer: 6

Question 3

correct coefficient	**B1**
correct power(s) of the letter(s)	**B1**

Answer: $8a^7c^{11}$

Question 4

applies the index law or writes both sides as powers of the same base	**M1**
n = 5	**A1**

Answer: n = 5

Question 5

use law: add the powers 2 + 3	**M1**
3^5 cao	**A1**
or give 243 cao	**B1**
isw - ignore subsequent working once 3^5 or 243 given	**E1**

Answer: 3^5 or 243

Question 6

(a) use $2^3 \times 2^2 = 2^{3+2}$	**M1**
(a) 2^5 cao	**A1**
(a) or 32 cao	**B1**

(a) Answer: 2^5 or 32

(b) use law $2^5 \div 2^4 = 2^{5-4}$	**M1**
(b) 2^1 cao	**A1**
(b) show numerical division $32 \div 16$ or $2^1 = 2$	**M1**
(b) 2 cao	**A1**
(b) both forms given or clear final answer	**B1**
(b) isw - ignore subsequent working once final answer shown	**E1**

(b) Answer: $2^1 = 2$

Question 7

recognise $32 = 2^5$ or take logs	**M1**
x = 5 cao	**A1**

Answer: 5

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