Name:

Exam Style Questions

Negative Indices
Fractional Indices

Corbettmaths

Equipment needed: Pen and Calculator

Guidance

1. Read each question carefully before you begin answering it.
2. Check your answers seem right.
3. Always show your workings

Video Tutorial

www.corbettmaths.com/contents

Videos 173, 175

Answers and Video Solutions

1. Find the value of 4^{-2}

$\frac{1}{4^2} = \frac{1}{16}$

$\frac{1}{16}$

(1)

2. Work out the value of 3^{-3}

$\frac{1}{3^3} = \frac{1}{27}$

$\frac{1}{27}$

(1)

3. Noah was asked to work out the value of 9^{-2}

He says "since $9^2 = 81$ that means $9^{-2} = -81$"

Is Noah correct?
Explain your answer.

$9^2 = 81$ $\quad 9^{-2} = \frac{1}{81}$

Noah worked out 9^2 correctly, but then he should have written "1 over 81" eg: $\frac{1}{81}$

(1)

4. Write 7^{-1} as a fraction

$\frac{1}{7}$

(1)

5. Circle the value of 2^{-5}

-32 $\quad \frac{1}{10}$ $\quad \frac{1}{32}$ $\quad -10$

$2^5 = 2 \times 2 \times 2 \times 2 \times 2$
$= 32$

(1)

6. Evaluate 10^{-4}

$10^4 = 10 \times 10 \times 10 \times 10$
$= 10\,000$

$10^{-4} = \frac{1}{10000}$

$\frac{1}{10000}$

(1)

7. Write down the value of 25^0

1

(1)

8. Write 5^{-3} as a fraction.

$\frac{1}{5^3}$ $\quad \frac{1}{125}$ $\quad \frac{1}{125}$

(1)

9. Write down the value of $\left(\frac{5}{3}\right)^{-1}$

$\frac{3}{5}$

(1)

10. Write down the value of $\left(\frac{2}{5}\right)^{-3}$

$\left(\frac{5}{2}\right)^{3} = \frac{125}{8}$

$\frac{125}{8}$ or $15\frac{5}{8}$

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(2)

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11. Write down the value of $36^{\frac{1}{2}}$

$\sqrt{36} = 6$

6

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(1)

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12. Circle the value of $100^{\frac{1}{2}}$

10 50 $\frac{1}{10}$ $\frac{1}{50}$

$\sqrt{100} = 10$

(1)

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13. Write down the value of $1000^{\frac{1}{3}}$

$\sqrt[3]{1000} = 10$

10

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(1)

14. Martin has been asked to work out $27^{\frac{1}{3}}$

He says "since $\frac{1}{3}$ of 27 is 9 that means $27^{\frac{1}{3}} = 9$"

Is Martin correct?
Explain your answer.

$\sqrt[3]{27} = 3$ since $3 \times 3 \times 3 = 27$

No, to the power of $\frac{1}{3}$, means the cube root. The cube root of 27 is 3

(1)

15. Write down the value of $16^{\frac{1}{4}}$

$\sqrt[4]{16} = 2$

2

(1)

16. Work out the value of $64^{\frac{2}{3}}$

$\sqrt[3]{64} = 4$

$4^2 = 16$

16

(2)

17. Write down the value of $125^{\frac{2}{3}}$

$\sqrt[3]{125} = 5$

$5^2 = 25$

25

(2)

18. Work out the value of

(a) $27^{\frac{2}{3}}$

$\sqrt[3]{27} = 3$

$3^2 = 9$

9

.....

(2)

(b) $10000^{\frac{3}{4}}$

$\sqrt[4]{10000} = 10$

$10^3 = 1000$

1000

.....

(2)

(c) $32^{-\frac{4}{5}}$

$\sqrt[5]{32} = 2$

$2^4 = 16$

$\frac{1}{16}$

.....

(2)

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19. Work out $16^{0.5}$

$16^{\frac{1}{2}}$

$\sqrt{16} = 4$

4

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(1)

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20. Work out $16^{\frac{3}{2}}$

$\sqrt{16} = 4$

$4^3 = 64$

64

.....

(2)

21. Write down the value of $49^{-\frac{1}{2}}$

$49^{\frac{1}{2}}$

$\sqrt{49} = 7$

$\frac{1}{7}$

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(2)

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22. Work out the value of $81^{-\frac{3}{4}}$

$\sqrt[4]{81} = 3$

$3^3 = 27$

$\frac{1}{27}$

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(2)

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23. Work out the value of

$$\left(\frac{16}{25}\right)^{\frac{1}{2}}$$

$\sqrt{16} = 4$

$\sqrt{25} = 5$

$\frac{4}{5}$

.....

(2)

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24. Work out $\left(\frac{9}{25}\right)^{\frac{3}{2}}$

$\sqrt{9} = 3$

$3^3 = 27$

$\sqrt{25} = 5$

$5^3 = 125$

$\frac{27}{125}$

.....

(3)

25. Work out $\left(\frac{27}{1000}\right)^{\frac{2}{3}}$

$\sqrt[3]{27} = 3$ $\quad$ $\sqrt[3]{1000} = 10$

$3^2 = 9$ $\quad$ $10^2 = 100$

$\frac{9}{100}$

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(3)

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26. Work out the value of $32^{-0.4}$

$32^{-\frac{2}{5}}$

$\sqrt[5]{32} = 2$

$2^2 = 4$

$\frac{1}{4}$

.....

(3)

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27. Work out $25^{\frac{1}{2}} \div 2^{-2}$

$\sqrt{25} = 5$

$2^{-2} = \frac{1}{2^2}$

$= \frac{1}{4}$

$5 \div \frac{1}{4} = 20$

20

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(3)

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28. Work out $125^{\frac{1}{3}} \times 2^{-3}$

$\sqrt[3]{125} = 5$ $\quad$ $2^{-3} = \frac{1}{2^3}$

$= \frac{1}{8}$

$5 \times \frac{1}{8} = \frac{5}{8}$

$\frac{5}{8}$

.....

(3)

29. Work out

$16^{1.5} + 8^0$

$16^{\frac{3}{2}} + 8^0$

$64 + 1 = 65$

$\sqrt{16} = 4$

$4^3 = 64$

65

.....

(3)

30. Work out the value of

$$\left(\frac{49}{100}\right)^{-\frac{1}{2}}$$

$\left(\frac{100}{49}\right)^{\frac{1}{2}} = \frac{10}{7}$

$\frac{10}{7}$ or $1\frac{3}{7}$

.....

(3)

31. w is greater than 1. e.g 2

Write in order, from smallest to largest.

w^0 w^3 $\frac{w^3}{w^4}$ w^{-2}

2^0 2^3 $\frac{2^3}{2^4}$ 2^{-2}

1 8 $\frac{1}{2}$ $\frac{1}{4}$

w^{-2}, $\frac{w^3}{w^4}$, w^0, w^3

.....

(4)

32. Work out $2^4 \times 4^{-2}$

$2^4 = 16$

$4^{-2} = \frac{1}{4^2}$

$= \frac{1}{16}$

$16 \times \frac{1}{16} = \frac{16}{16}$

$= 1$

1

.....

(2)

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33. Work out

10^{-2}

Give your answer as a decimal.

$\frac{1}{10^2} = \frac{1}{100}$

0.01

.....

(2)

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34. Simplify fully $4^{-2} \times (4^{\frac{1}{3}})^3$

$\frac{1}{4^2} \times 4^{\frac{3}{3}}$

$\frac{1}{16} \times 4^1$

$\frac{1}{16} \times 4 = \frac{4}{16}$

$= \frac{1}{4}$

$\frac{1}{4}$

.....

(3)

35. Simplify fully $7 \times 7^0 \times 7^{-1}$

$7 \times 1 \times \frac{1}{7}$

$= 7 \times \frac{1}{7}$

$= 1$

1

.....

(2)

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36. Isaac claims that the values of two of the numbers below are equal.

$9^{-\frac{3}{2}}$ $\quad$ 3^{-2} $\quad$ $0.\dot{0}3\dot{7}$ $\quad$ $16^{-\frac{3}{4}}$

$\frac{1}{27}$ $\quad$ $\frac{1}{9}$ $\quad$ $\frac{1}{8}$

Is Isaac correct?

You **must** show your working.

$9^{-\frac{3}{2}} = \frac{1}{27}$ $\quad$ $3^{-2} = \frac{1}{9}$

$\sqrt{9} = 3$

$3^3 = 27$

$3^2 = 9$

$x = 0.037037037...$

$1000x = 37.037037...$

$999x = 37$

$x = \frac{1}{27}$

$16^{-\frac{3}{4}} = \frac{1}{8}$

$\sqrt[4]{16} = 2$

$2^3 = 8$

yes $9^{-\frac{3}{2}}$ and $0.\dot{0}3\dot{7}$ are equal.

(6)

37. Work out $\dfrac{49^{\frac{1}{2}} + 8^{\frac{4}{3}}}{16^{-\frac{1}{2}}}$

$\sqrt{49} = 7$

$\sqrt[3]{8} = 2$

$2^4 = 16$

$\sqrt{16} = 4$

$7 + 16$

$\frac{1}{4}$

$\frac{23}{\frac{1}{4}}$

$23 \div \frac{1}{4} = 92$

92

.....

(4)

38. Write the numbers below in the form 2^n

(a) 4

2^2

.....

(1)

(b) 8

2^3

.....

(1)

(c) 32

2^5

.....

(1)

(d) $\frac{1}{2}$

2^{-1}

.....

(1)

(e) $\frac{1}{4}$

2^{-2}

.....

(1)

(f) $\sqrt{2}$

$2^{\frac{1}{2}}$

.....

(1)

(g) $\sqrt{8}$ $\sqrt{2^3}$

$2^{\frac{3}{2}}$

.....

(2)

39. Write the numbers below in the form 5^n

(a) 5

5^1

.....

(1)

(b) 625

$5 \times 5 \times 5 \times 5$

5^4

.....

(1)

(c) 1

5^0

.....

(1)

(d) $\frac{1}{5}$

5^{-1}

.....

(1)

(e) $\sqrt{5}$

$5^{\frac{1}{2}}$

.....

(1)

(f) $\sqrt{125}$

$\sqrt{5^3}$

$5^{\frac{3}{2}}$

.....

(2)

(g) $\sqrt{3125}$

$5 \times 5 \times 5 \times 5 \times 5 = 3125$

$\sqrt{5^5}$

$5^{\frac{5}{2}}$

.....

(2)

40. Write 8 in the form 4^n

$4^{\frac{3}{2}}$

.....

(2)

41. Write 32 in the form 4^n

$4^{\frac{5}{2}}$

.....

(2)

42. Write $16^{\frac{3}{4}} \times 4^9$ in the form 2^n

8×4^9

$2^3 \times (2^2)^9$

$2^3 \times 2^{18} = 2^{21}$

2^{21}

.....

(3)

43. Write $125^{\frac{1}{3}} \div 25^4$ in the form 5^n

$5 \div (5^2)^4$

$5^1 \div 5^8$

5^{-7}

5^{-7}

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(3)