Name:

Level 2 Further Maths

Equations involving Indices/Roots

Corbettmaths

Ensure you have: Pencil or pen

Guidance

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

Revision for this topic

www.corbettmaths.com/more/further-maths/

1. Solve $\sqrt[3]{8x-1}=5$

$8x-1=125$

$8x=126$

$x=\frac{63}{4}$

.....

(2)

---

2. Solve $\frac{3}{4}\sqrt{x}=2$

$\sqrt{x}=2\div\frac{3}{4}$

$\sqrt{x}=\frac{8}{3}$

$x=\frac{64}{9}$

.....

(2)

---

3. Solve $x^{-2}=49$

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

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

$x=\pm\frac{1}{7}$

.....

(2)

4. Solve $\sqrt{\left(10+\sqrt{x}\right)}=16$

$10+\sqrt{x}=256$

$\sqrt{x}=246$

$x=60516$

.....

(2)

---

5. Solve $(2+\sqrt{y})^{\frac{1}{4}}=\#3$

$2+\sqrt{y}=81$

$\sqrt{y}=79$

$y=6241$

.....

(3)

---

6. Solve $x^{\frac{2}{3}}=2\frac{7}{9}$

$x^{\frac{2}{3}}=\frac{25}{9}$

$x^{\frac{1}{3}}=\frac{5}{3}$

$x=\frac{125}{27}$

.....

(3)

7. Solve $x^{\frac{3}{2}} = \frac{64}{729}$

$x^{\frac{1}{2}} = \frac{4}{9}$

$x = \frac{16}{81}$

.....

(3)

---

8. Solve $x^{-\frac{1}{2}} = 2\frac{1}{4}$

$x^{-\frac{1}{2}} = \frac{9}{4}$

$x^{\frac{1}{2}} = \frac{4}{9}$

$x = \frac{16}{81}$

.....

(3)

---

9. Solve $x^{-0.25} = 0.1$

$x^{-\frac{1}{4}} = 0.1$

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

$x^{\frac{1}{4}} = 10$

$x = 10000$

.....

(3)

10. Solve $\dfrac{24}{\sqrt[4]{x}} = 3$

$24 = 3x^{\frac{1}{4}}$

$8 = x^{\frac{1}{4}}$

$x = 4096$

.....

(2)

---

11. Solve $4x^{\frac{1}{3}} + 5 = 0$

$4x^{\frac{1}{3}} = -5$

$x^{\frac{1}{3}} = -1.25$

$x = -\dfrac{125}{64}$

.....

(3)

---

12. Solve $\sqrt{\left(100 - \sqrt[3]{x}\right)} = 6$

$(100 - x^{\frac{1}{3}}) = 36$

$x^{\frac{1}{3}} = 64$

$x = 262144$

.....

(3)

13. Solve $\sqrt[3]{\left(42-3\sqrt{x}\right)}=3$

$42 - 3x^{\frac{1}{2}} = 27$

$3x^{\frac{1}{2}} = 15$

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

$x = 25$

.....

(4)

---

14. Solve $4^{3x+1} \times 32^{1.2x} = 16^{11-x}$

$(2^2)^{3x+1} \times (2^5)^{1.2x} = (2^4)^{11-x}$

$2^{6x+2} \times 2^{6x} = 2^{44-4x}$

$2^{12x+2} = 2^{44-4x}$

$12x + 2 = 44 - 4x$

$16x = 42$

$x = 2.625$

.....

(5)

15. Solve $81^3 + 81^3 + 81^3 + 81^3 + 81^3 = 3^x$

$81 = (3^4)$

$9 \times 81^3 = 3^x$

$(3^2) \times (3^4)^3 = 3^x$

$(3^2) \times (3^{12}) = 3^x$

$3^{14} = 3^x$

$x = 14$

.....

(3)

16. Solve $2^x + 1 = \sqrt{3(1 - 2^{x-1})}$

$(2^x + 1)^2 = 3(1 - 2^{x-1})$

$(2^x + 1)(2^x + 1) = 3 - 3 \times 2^{x-1}$

$2^{2x} + 2 \times 2^x + 1 = 3 - 3 \times 2^{x-1}$

$(2^x)^2 + 2 \times 2^x + 1 = 3 - 3 \times (2^x \times 2^{-1})$

$(2^x)^2 + 2 \times 2^x + 1 = 3 - \frac{3}{2} \times 2^x$

$(2^x)^2 + \frac{7}{2} \times 2^x - 2 = 0$

$2(2^x)^2 + 7 \times 2^x - 4 = 0$ let $y = 2^x$

$2y^2 + 7y - 4 = 0$

$(2y - 1)(y + 4) = 0$

$y = \frac{1}{2}$ or $y = -4$

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

✓ ✗

$x = -1$

.....

(5)