



DJCS Mathematics Department

GCSE to AS induction - Practice Exercise.

If you struggle with a question then watch the video and try the related exercises from the links at the left hand side. To revise a whole topic, check the links at the end of this exercise.

1. Evaluate

$$10^2 \qquad 64^{1/2} \qquad 8^{4/3}$$

[Khan Academy Video: Basic Fractional Exponents](#)

2. Express as a power of 3

$$3^2 \times 3^5 \qquad 3^{10} \div 3^2 \qquad (3^2)^3 \qquad 3^2 \times 9^4$$

[Khan Academy Video: Exponent Rules](#)

3. The points A, B and C have the following coordinates: A (7, 5), B (3, -3) and C (-1, 9).

- Find the gradient of AB, BC and CA.
- What type of triangle is triangle ABC?
- Find the area of triangle ABC
- Find the equation of the line parallel to AB, passing through the point D(1, 4)

[Khan Academy Video: Slope of a Line](#)

[Khan Academy Video: Distance Formula](#)

4. Expand and simplify:

- $(5x + 3)^2 + (3x + 1)^2$
- $(5x + 3)^2 - (3x + 1)^2$
- $3(5x + 3)^2 + 2(3x + 1)^2$
- $3(5x + 3)^2 - 2(3x + 1)^2$

[Khan Academy Video: Multiplying Binomials](#)

5. Simplify

$$\sqrt{75} \qquad \sqrt{72} \qquad \sqrt{48} \qquad \sqrt{80} \qquad \sqrt{98}$$

[Khan Academy Video: Simplifying Square Roots](#)



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6. Express in the form $a\sqrt{b}$

$$\sqrt{75} + \sqrt{48} \quad \sqrt{98} - \sqrt{72}$$

[Khan Academy Video: Adding and Simplifying Radicals](#)

7. Rationalise

$$\frac{10}{\sqrt{5}} \quad \frac{12}{\sqrt{3}} \quad \frac{4}{1+\sqrt{7}} \quad \frac{42}{5-\sqrt{2}} \quad \frac{10}{2-\sqrt{3}}$$

[Khan Academy Video: How to Rationalize a Denominator](#)

8. Solve the following leaving your answers in surd form where necessary.

- $x^2 + x - 12 = 0$
- $2x^2 + 5x - 3 = 0$
- $16 - x^2 = 0$
- $3x^2 + 10x - 5 = 0$

[Khan Academy Video: Solving a Quadratic Equation by Factoring](#)

[Khan Academy Video: How to Use the Quadratic Formula](#)

[Khan Academy Video: Solving Quadratic Equations by Completing the Square](#)

9. Solve the following inequalities

- $2x + 10 \leq 17$
- $x^2 + x - 12 \leq 0$
- $2x^2 + 5x - 3 \geq 0$

[Khan Academy Video: Multi-Step Linear Inequalities](#)

[Khan Academy Video: Quadratic Inequalities](#)

Useful Topic Lists and Collections of Exercises:

Questions 1, 2, 5, 6, 7 [Khan Academy: Exponents, Radicals, and Scientific Notation](#)

Question 3 [Khan Academy: Analytic Geometry](#) [Graphing Linear Functions](#)

Questions 4, 5 [Khan Academy: Multiplying and Factoring Expressions](#)

Questions 8, 9 [Khan Academy: Quadratic Equations](#)

Question 9 [Khan Academy: Linear Inequalities](#)