

Practice set 1



In Questions 1 to 12, select the correct answer **A**, **B**, **C** or **D**.

1 Write $\frac{1}{\sqrt[3]{(x-2)^5}}$ in index form.

A $(x-2)^{\frac{5}{3}}$

B $\frac{(x-2)^{\frac{5}{2}}}{3}$

C $3(x-2)^{\frac{5}{2}}$

D $\frac{1}{(x-2)^{\frac{5}{3}}}$

2 Simplify $\frac{(2a^3b)^3}{(ab)^2}$.

A $8a^7b$

B $8a^8b$

C $2a^7b$

D $2a^8b$

3 Evaluate $4^{-\frac{3}{2}}$.

A -8

B $\frac{1}{8}$

C $\frac{1}{6}$

D -6

4 Simplify $\frac{a^2 - 6a + 9}{a^2 - 9}$.

A $\frac{1}{a+3}$

B $\frac{a-3}{a+3}$

C $\frac{a+3}{a-3}$

D $\frac{-6a+9}{a-9}$

5 Factorise $a^2 - \frac{b^2}{4}$.

A $\left(a - \frac{b}{2}\right)^2$

B $\left(a + \frac{b}{4}\right)\left(a - \frac{b}{4}\right)$

C $\left(a + \frac{b}{2}\right)^2$

D $\left(a + \frac{b}{2}\right)\left(a - \frac{b}{2}\right)$

6 The solution to $x^2 + 2x - 6 = 0$ is:

A $x = -1 \pm 2\sqrt{7}$

B $x = \frac{2 \pm \sqrt{28}}{2}$

C $x = \frac{-2 \pm \sqrt{-20}}{2}$

D $x = -1 \pm \sqrt{7}$

7 **EXT1** The solution to the equation $\frac{3}{x+5} \leq 2$ is:

A $x < -5, x > -3\frac{1}{2}$

B $-5 < x \leq -3\frac{1}{2}$

C $x < -5, x \geq -3\frac{1}{2}$

D $3\frac{1}{2} \leq x < 5$

8 **EXT1** What is the number of possible outcomes when arranging the letters of the word LITERATURE?

A $\frac{10!}{2!2!}$

B $\frac{10!}{2!2!2!}$

C $10!$

D $\frac{10!}{3!}$

9 **EXT1** The number of possible different PINs with a combination of 4 numbers and 2 letters is:

A 4 435 236

B 6 760 000

C 1 000 000

D 10 676

10 **EXT1** The number of possible seating positions for 12 people sitting at a round table is:

A ${}^{12}C_{11}$

B $11!$

C $12!$

D ${}^{12}P_{11}$

11 **EXT1** Combination nC_r is equal to:

A $(n-r)!{}^nP_r$

B $\frac{{}^nP_r}{(n-r)!}$

C $r!{}^nP_r$

D $\frac{{}^nP_r}{r!}$

12 **EXT1** The binomial expansion of $(x+3)^4$ is:

A $x^4 + 12x^3 + 54x^2 + 108x + 81$

B $x^4 + 4x^3 + 18x^2 + 12x + 3$

C $x^4 + 3x^3 + 9x^2 + 27x + 81$

D $x^4 + 4x^3 + 6x^2 + 4x + 1$

13 Solve:

a $3x - 7 = 23$

b $5(b - 3) = 15$

c $\frac{x}{3} + 4 = 5$

d $4y - 7 = 3y + 9$

e $8z + 1 = 11z - 17$

f $2^x = 32$

g $9^{y-1} = 3$

h $x^2 - 3x = 0$

i $|x + 2| = 5$

j $|5a - 2| = 8$

14 Solve for p : $\frac{p-3}{2} - \frac{p+1}{5} = 1$.

15 Simplify $2\sqrt{12}$.

16 **EXT1** Find the number of ways of seating 10 people around a table at random:

a if 3 people are to sit together

b if 2 people must not sit together.

- 17** **EXT1** A batch of 2300 spare parts for cars was placed on 11 different shelves. Find the smallest number of spare parts that were placed on at least one shelf.
- 18** Factorise fully: $10x + 2xy - 10y - 2y^2$.
- 19** Write in index form:
- a** $\frac{1}{x}$ **b** $\sqrt[3]{x^4}$
- 20** Simplify the expression $8y - 2(y + 5)$.
- 21** Rationalise the denominator of $\frac{5}{5 - \sqrt{2}}$.
- 22** **EXT1** In how many different ways can a committee of 4 people be selected from a group of 9 people?
- 23** **EXT1** A team of 3 boys and 5 girls is chosen at random from a class of 12 boys and 18 girls. In how many ways can this be done?
- 24** Solve $2x^2 - 3x - 1 = 0$ correct to 3 significant figures.
- 25** **EXT1** How many committees of 5 people could be formed randomly from a meeting of 20 people?
- 26** Simplify $\frac{x+1}{5} \div \frac{x^2-2x-3}{10}$.
- 27** Evaluate $(3.9)^4$ correct to 1 decimal place.
- 28** Simplify $2\sqrt{3} - \sqrt{27}$.
- 29** **EXT1** Find the probability that if 12 people sit around a table at random, 3 particular friends will be seated together.
- 30** **EXT1** In how many ways can 4 different letters be selected from the word TRIGONOMETRY?
- 31** Expand and simplify $(x - 3)(x^2 + 5x - 1)$.
- 32** **EXT1** Show that:
- a** ${}^{10}C_4 = {}^{10}C_6$ **b** $\binom{5}{2} = \binom{4}{1} + \binom{4}{2}$
- 33** Expand and simplify $\sqrt{2}(3\sqrt{5} - 2\sqrt{2})$.
- 34** Simplify $\frac{2x+6}{2}$.
- 35** Solve $4a - 5 < 7a + 4$.

36 **EXT1** Evaluate:

a $5!$

b 8C_6

37 The radius r of a circle with area A is given by $r = \sqrt{\frac{A}{\pi}}$. Find r , correct to 2 decimal places, if $A = 7.59$.

38 **EXT1** A store sells T-shirts in 7 different sizes. How many T-shirts need to be selected so that 2 must be the same size?

39 Solve each set of simultaneous equations.

a $3a - b = 7$ and $2a + b = 8$

b $a + b - c = 8$, $b + c = 5$ and $a + 2c = 3$

40 Solve $5 - 2x < 3$ and show the solution on a number line.

41 Solve the equation $x^2 - 4x + 1 = 0$, giving exact solutions in simplest surd form.

42 Write 7^{-2} as a rational number.

43 Solve the simultaneous equations $y = 3x - 1$ and $y = x^2 - 5$.

44 **EXT1** Expand:

a $(3x + y)^5$

b $(\sqrt{2} - 3)^4$

45 **EXT1** Evaluate a and b if $(2\sqrt{3} + \sqrt{2})^3 = a\sqrt{3} + b\sqrt{2}$.

46 Find integers x and y such that $\frac{\sqrt{3}}{2\sqrt{3} + 3} = x + y\sqrt{3}$.

47 Evaluate $|-2|^2 - |-1| + |4|$.

48 Factorise $8x^2 - 32$.

49 Rationalise the denominator of $\frac{2\sqrt{3}}{3\sqrt{5} - \sqrt{2}}$.

50 Simplify $2|-4| - |3| + |-2|$.

51 Rationalise the denominator of $\frac{\sqrt{5} + 1}{2\sqrt{2} + 3}$.

52 Simplify $\frac{(a^{-4})^3 \times b^6}{a^9 \times (b^{-1})^4}$.

53 Evaluate $4^{-\frac{3}{2}}$ as a rational number.

54 **EXT1** A committee of 5 people is to be formed from a group of 12 women and 9 men. Find the number of ways of forming the committee if:

- a** there are no restrictions
- b** there are to be 3 women and 2 men on the committee:
 - i** with no restrictions
 - ii** if Sue will be on the committee.

55 Simplify $2(x - 5) - 3(x - 1)$.

56 Solve $4^{2x+1} = 8$.

57 Write $\frac{1}{x+3}$ in index form.

58 Find the value of a^3b^{-2} in index form if $a = \left(\frac{1}{2}\right)^3$ and $b = \left(\frac{4}{5}\right)^2$.

59 Write $(3x + 2)^{-\frac{1}{2}}$ without an index.

60 Simplify:

a $8x - 7y - y + 4x$

b $\sqrt{124}$

c $\frac{x^2 - 9}{2x^2 + 5x - 3}$

d $\frac{1}{\sqrt{2} + 1} + \frac{2}{\sqrt{2} - 1}$

e $\frac{3}{x+1} + \frac{2}{x^2-1} - \frac{4}{x-1}$

f $x - \frac{1}{x}$ when $x = 2\sqrt{3}$

g $\frac{(x^{-2})^5 y^4 z^{-3}}{x^4 (y^3)^{-1} (z^{-4})^{-2}}$

h $\frac{a+b}{5a-20ab^2} \div \frac{a^2+2ab+b^2}{3-6b}$

i $8\sqrt{5} - 3\sqrt{20} + 2\sqrt{45}$

j $\frac{a^3b^2(c^4)^2}{(a^2)^2bc^5}$ if $a = \left(\frac{1}{2}\right)^2$, $b = \left(\frac{2}{3}\right)^3$ and $c = \left(\frac{4}{9}\right)^{-1}$.

61 The volume of a sphere is given by the formula $V = \frac{4}{3}\pi r^3$. Find the exact radius r if the volume V is $10\frac{2}{3}$ cm³.

62 Find the value of k if $(2x + 5)^2 = 4x^2 + kx + 25$.

63 Simplify $\sqrt{81x^2y^3}$.

64 Factorise:

a $5(a - 2)^2 + 40(a - 2)$

b $(2a - b + c)^2 - (a + 5b - c)^2$

65 Solve $-2 \leq \frac{8x-1}{5} < 9$.

66 Simplify $\frac{x+1}{5} - \frac{x+2}{3}$.

67 Solve $x^2 - 5x = 0$.

68 Solve $x^2 - 5x - 1 = 0$ and write the solutions correct to 2 decimal places.

69 Simplify $\sqrt{8} + \sqrt{98}$.

70 Write $\frac{3}{x^2+5x} - \frac{4}{x} + \frac{2}{x+5}$ as a single fraction.

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

72 Factorise:

a $x^2 - 2x - 8$

b $a^2 - 9$

c $y^2 + 6y + 9$

d $t^2 + 8t + 16$

e $3x^2 - 11x + 6$

73 **EXT1** Solve each inequality:

a $a^2 - 1 < 0$

b $y^2 + 3y \geq 0$

c $y^2 - y - 2 \leq 0$

d $x^2 > 9$

e $2d - d^2 \geq 0$

74 **EXT1** Solve each inequality:

a $|5x - 9| > 21$

b $|3x - 7| < 2$

75 **EXT1** Solve each inequality:

a $\frac{5}{x} > 1$

b $\frac{x}{x-2} \leq 3$

c $\frac{3}{x-4} < 5$

d $\frac{-1}{2x-1} \leq 4$

e $\frac{x}{x-2} > 3$

76 **EXT1** Expand $(2x - 3)^4$.

77 **EXT1** How many different 11-letter 'words' can be made at random from the word MISSISSIPPI?

78 **EXT1** Solve each inequality:

a $m^2 - 5m + 6 \geq 0$

b $x^2 - 4 > 0$

c $p^2 - p < 0$

79 Solve:

a $5x - 4 = 2x + 11$

b $y^2 - 2y - 13 = 0$ (correct to 2 decimal places)

c $4^{2x} = 8$

d $|2b + 3| = 7$

e **EXT1** $m^2 \leq 9$

f **EXT1** $|5n - 1| > 9$