

Math Comprehensive Practice Papers

CAPS and IEB

Grade

11



Louise Nieuwenhuizen

**Math
Comprehensive
Practice Papers
Grade 11**

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BB1	Paper 1 work	82	313
BB2	Paper 2 work	87	323
CC1	Paper 1 work	94	336
CC2	Paper 2 work	100	343
DD1	Paper 1 work	108	358
DD2	Paper 2 work	113	367

PAPER A: EQUATIONS AND INEQUALITIES

1. Regard the following expressions:
 - a) Determine whether each of the expressions have a maximum or minimum value.
 - b) Determine the maximum/minimum value by completing the square.
 - c) For which value of x does the expression have a maximum/minimum value?

1.1 $x^2 - 6x + 3$

1.2 $-3x^2 - 4x - 1$

1.3 $4x^2 + 5x - 2$

1.4 $-x^2 + x + 1$

1.5 $2x^2 + 5x + 5$

2. Solve the following equations by completing the square:

2.1 $x^2 - 7x + 2 = 0$

2.2 $-2x^2 + 3x + 11 = 0$

3. Solve for x :

3.1 $2x^2 + 5x - 3 = 0$

3.2 $7x^2 = 3x$

3.3 $2x^2 - 8 = 0$

3.4 $3x^2 + 2x = 8$

3.5 $3x^2 = 10x - 3$

3.6 $-8x^2 - 14x - 5 = 0$

3.7 $(x + 4)(x - 1) = 0$

3.8 $(x + 4)(x - 1) = 6$

3.9 $2x^2 - 11x + 5 = 0$

3.10 $x^4 - 1 = 0$

4. Solve for x leaving your answers in the simplest surd form:

4.1 $x^2 + 3x - 2 = 0$

4.2 $x^2 + 5x = -2$

4.3 $5x^2 = -2x + 1$

4.4 $-2x^2 + 14 = 24x$

5. Solve for x . Leave your answers rounded off to two decimal places:

5.1 $-5x = x^2 + 2$

5.2 $x^2 = 14$

5.3 $x^2 + \frac{11}{3}x + 3 = 0$

5.4 $6x^2 = -x + 3$

5.5 $(x + 4)(x - 2) = 10$

5.6 $2(x + 1) + (x - 1)(2x + 1) = x(x - 2)$

PAPER A: EQUATIONS AND INEQUALITIES

6. Solve for x leaving your answers rounded off to two decimal places where necessary:

$$\begin{aligned}
 6.1 \quad & \frac{4}{x-2} + x = 6 \\
 6.2 \quad & \frac{x}{x+1} + \frac{2}{x^2-3x-4} = \frac{5}{x-4} \\
 6.3 \quad & \frac{3}{x+3} + \frac{x-1}{x-3} = \frac{4}{9-x^2} \\
 6.4 \quad & \frac{3x^2}{x+2} + \frac{6(-x-4)}{x+2} = -18 \\
 6.5 \quad & \frac{1}{x+1} - \frac{2}{x-3} = \frac{2x+10}{2x^2-4x-6} \\
 6.6 \quad & \frac{4}{2x-6} - \frac{1}{x+1} = \frac{1}{\frac{1}{2}(2x^2-4x-6)} \\
 6.7 \quad & \frac{4}{x+1} - \frac{4}{x-2} = \frac{-4}{(x+1)(x-2)} \\
 6.8 \quad & \sqrt{x^2-3x} = 2 \\
 6.9 \quad & x = \sqrt{3x+10} \\
 6.10 \quad & x = 3\sqrt{x+2} + 2 \\
 6.11 \quad & p = \sqrt{c+2x} \\
 6.12 \quad & 3(x+1)^2 + 20(x+1) - 32 = 0 \\
 6.13 \quad & 2x+1-6 = \frac{16}{2x+1} \\
 6.14 \quad & 2(x-2)^4 - 5(x-2)^2 - 3 = 0 \\
 6.15 \quad & 2\sqrt{x+3} - 13 = \frac{-20}{\sqrt{x+3}}
 \end{aligned}$$

7. Solve for x and y simultaneously:

$$\begin{aligned}
 7.1 \quad & x = 2y + 3 \\
 & 2x^2 - 2y^2 = 2xy + 2 \\
 7.2 \quad & \frac{1}{x} + y = -\frac{7}{4} \\
 & 2x + y = 6 \\
 7.3 \quad & xy + x = 3 \\
 & 3y = 6x \\
 7.4 \quad & x - 3y = -11 \\
 & x^2 + xy + y^2 = 3y + x \\
 7.5 \quad & xy - x^2 - y^2 = 0 \\
 & x - 5 = 2y \\
 7.6 \quad & 5^x \cdot 5^y = 25 \\
 & x^2 + 2y^2 = 3 \\
 7.7 \quad & \frac{4}{x} - y = 0 \\
 & y - 3x = 1
 \end{aligned}$$

8. Solve for x :

8.1 $2x^2 - 12x - 32 > 0$

8.2 $x^2 \leq 5x$

8.3 $-x^2 + 9 \leq 0$

8.4 $3x^2 < 0$

8.5 $\frac{5}{x+2} > 0$

8.6 $-x^2 > 9$

8.7 $2^x(x-1) < 0$

8.8 $\frac{-4}{x-3} > 0$

8.9 $(x+2)^2(x-4) \leq 0$

8.10 $\frac{x^2}{x+7} \geq 0$

8.11 $\sqrt{x-3} < 0$

9.1 For what values of x will:

$$\frac{2x^2 + 9x - 5}{x - 6}$$

a) be undefined?

b) be equal to 0?

9.2 For which values of x will:

$$\frac{\sqrt{x+4}}{x+1}$$

a) be undefined?

b) be real?

c) be equal to 0?

9.3 For which values of x will:

$$\frac{\sqrt{x-16}}{(x-4)(x+4)}$$

a) be undefined?

b) be non-real?

c) be equal to 0?

9.4 For which values of x will:

$$\sqrt{16 - 25x^2}$$

a) be real?

b) be equal to 0?

10. Determine the nature of the roots of the following equations without solving for x :

10.1 $2x^2 + 5x - 3 = 0$

10.2 $3x^2 + 6x + 10 = 0$

1.1 a) $a = 1 > 0$ $\therefore x^2 - 6x + 3$ has a minimum value.

b)

$$\begin{aligned} & x^2 - 6x + \left(\frac{1}{2} \times -6\right)^2 - \left(\frac{1}{2} \times -6\right)^2 + 3 \\ &= x^2 - 6x + (-3)^2 - (-3)^2 + 3 \\ &= (x - 3)^2 - 6 \end{aligned}$$

Minimum value is -6

c) Minimum value is at $x = 3$

1.2 a) $a = -3 < 0$ $\therefore -3x^2 - 4x - 1$ has a maximum value.

b)

$$\begin{aligned} & -3x^2 - 4x - 1 \\ &= -3 \left[x^2 + \frac{4}{3}x + \frac{1}{3} \right] \\ &= -3 \left[x^2 + \frac{4}{3}x + \left(\frac{1}{2} \times \frac{4}{3}\right)^2 - \left(\frac{1}{2} \times \frac{4}{3}\right)^2 + \frac{1}{3} \right] \\ &= -3 \left[\left(x + \frac{2}{3}\right)^2 - \frac{4}{9} + \frac{1}{3} \right] \\ &= -3 \left[\left(x + \frac{2}{3}\right)^2 - \frac{1}{9} \right] \\ &= -3 \left(x + \frac{2}{3}\right)^2 + \frac{1}{3} \end{aligned}$$

Maximum value is $\frac{1}{3}$

c) Maximum value is at $x = -\frac{2}{3}$

1.3 a) $a = 4 > 0$ $\therefore 4x^2 + 5x - 2$ has a minimum value.

b)

$$\begin{aligned} & 4x^2 + 5x - 2 \\ &= 4 \left[x^2 + \frac{5}{4}x - \frac{1}{2} \right] \\ &= 4 \left[x^2 + \frac{5}{4}x + \left(\frac{1}{2} \times \frac{5}{4}\right)^2 - \left(\frac{1}{2} \times \frac{5}{4}\right)^2 - \frac{1}{2} \right] \\ &= 4 \left[\left(x + \frac{5}{8}\right)^2 - \left(\frac{5}{8}\right)^2 - \frac{1}{2} \right] \\ &= 4 \left[\left(x + \frac{5}{8}\right)^2 - \frac{57}{64} \right] \\ &= 4 \left(x + \frac{5}{8}\right)^2 - \frac{57}{16} \end{aligned}$$

Minimum value is $-\frac{57}{16}$

c) Minimum value is at $x = -\frac{5}{8}$

1.4 a) $a = -1 < 0 \quad \therefore -x^2 + x + 1$ has a maximum value.

b)

$$\begin{aligned}
 & -x^2 + x + 1 \\
 &= -[x^2 - x - 1] \\
 &= -\left[x^2 - x + \left(\frac{1}{2} \times -1\right)^2 - \left(\frac{1}{2} \times -1\right)^2 - 1\right] \\
 &= -\left[\left(x - \frac{1}{2}\right)^2 - \frac{1}{4} - 1\right] \\
 &= -\left[\left(x - \frac{1}{2}\right)^2 - \frac{5}{4}\right] \\
 &= -\left(x - \frac{1}{2}\right)^2 + \frac{5}{4}
 \end{aligned}$$

Maximum value is $\frac{5}{4}$

c) Maximum value is at $x = \frac{1}{2}$

1.5 a) $a = 2 > 0 \quad \therefore 2x^2 + 5x + 5$ has a minimum value.

b)

$$\begin{aligned}
 & 2x^2 + 5x + 5 \\
 &= 2\left[x^2 + \frac{5}{2}x + \frac{5}{2}\right] \\
 &= 2\left[x^2 + \frac{5}{2}x + \left(\frac{1}{2} \times \frac{5}{2}\right)^2 - \left(\frac{1}{2} \times \frac{5}{2}\right)^2 + \frac{5}{2}\right] \\
 &= 2\left[\left(x + \frac{5}{4}\right)^2 - \frac{25}{16} + \frac{5}{2}\right] \\
 &= 2\left[\left(x + \frac{5}{4}\right)^2 + \frac{15}{16}\right] \\
 &= 2\left(x + \frac{5}{4}\right)^2 + \frac{15}{8}
 \end{aligned}$$

Minimum value is $\frac{15}{8}$

c) Minimum value is at $x = -\frac{5}{4}$

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About the author

Louise Nieuwenhuizen holds a B Sc degree with Mathematics III and an HOD qualification and with more than 27 years of experience teaching Mathematics to learners from Grade 6–12. She has a big passion for Mathematics and education. She is known for her clear explanations, strong subject knowledge, and ability to present challenging concepts in an understandable way.

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