

**SUGGESTED ANSWERS FOR
KZN12 SUPPORT MATHS P1**

1.1.1 $x^2 + 2x - 3 = 0$
 $(x + 3)(x - 1) = 0$
 $x = -3$ or $x = 1$

1.1.2 $3x^2 + 5x + 1 = 0$

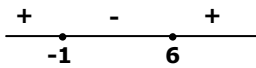
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-5 \pm \sqrt{(5)^2 - 4(3)(1)}}{2(3)}$$

$$= \frac{-5 \pm \sqrt{13}}{6}$$

$x = -0,23$ or $x = -1,43$

1.1.3 $x^2 - 5x - 6 \geq 0$
 $(x - 6)(x + 1) \geq 0$



$x \leq -1$ or $x \geq 6$

1.2

$x = 2 - 3y$
sub in eqn:

$$y^2 - xy = y - x$$

$$y(y - x) - (y - x) = 0$$

$$(y - x)(y - 1) = 0$$

$$[y - (2 - 3y)][y - 1] = 0$$

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

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

$x = 2 - 3\left(\frac{1}{2}\right)$ or $x = 2 - 3(1)$

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

1.3 $(a - b)(a + b) = 0$

$1000\,000\,000\,000 + 999\,999\,999\,999$
 $= 1\,999\,999\,999\,999$

2.1 $T_n = a + (n - 1)d = 242$

$-3 + (n - 1)(5) = 242$

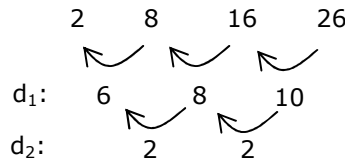
$(n - 1)(5) = 245$

$n - 1 = \frac{245}{5}$

$n = 49 + 1$

$= 50$ terms

2.2.1



Next term will be $26 + 12 = 38$
followed by $26 + 12 + 14 = 52$

2.2.2

$2a = 2$
 $a = 1$

$3a + b = T_2 - T_1$

$3 + b = 6$

$b = 3$

$a + b + c = T_1$

$1 + 3 + c = 2$

$c = -2$

$T_n = n^2 + 3n - 2$

2.2.3 No, since 12 369 is odd.
Both differences are even. No
addition of evens will result in
an odd number.

3.1.1

$r = \frac{1}{2}(x - 3)$

$T_n = ar^{n-1}$

$= 4(x - 3) \left[\frac{1}{2}(x - 3) \right]^{n-1}$

$= 2^2 \cdot (x - 3) \cdot \frac{(x - 3)^{n-1}}{2^{n-1}}$

$= 2^{3-n} \cdot (x - 3)^n$

3.1.2

$-1 < \frac{1}{2}(x - 3) < 1$

$-2 < x - 3 < 2$

$1 < x < 5$; $x \neq 3$

3.1.3 $S_\infty = \frac{a}{1 - r}$

$= \frac{4(x - 3)}{1 - \frac{1}{2}(x - 3)}$

$= \frac{4(4 - 3)}{1 - \frac{1}{2}(4 - 3)}$

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

4.1.1 Yes.



$S_n = \frac{n}{2}[2a + (n - 1)d]$

$S_{10} = \frac{10}{2}[2(1) + 9(1)]$
 $= 55$

4.1.2 $1^3 + 2^3 + \dots + 99^3 + 100^3$
 $= (1 + 2 + \dots + 99 + 100)^2$
 $= \sqrt{\left(\frac{100 \times 101}{2}\right)^2}$
 $= 5050.$

5.1.1 $x = 2$; $y = -1$

5.1.2 y-int: $y = \frac{3}{0 - 2} - 1 = -2\frac{1}{2}$

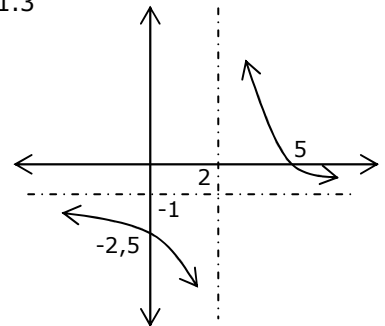
x-int : $0 = \frac{3}{x - 2} - 1$

$\frac{3}{x - 2} = 1$

$x - 2 = 3$

$x = 5$

5.1.3



5.1.4 $y = -\frac{3}{x} - 1$

6.1.1 $(x - 2)^2 - 16 = 0$

$(x - 2)^2 = 16$

$x - 2 = 4$ or $x - 2 = -4$

$x = 6$ $x = -2$

A(-2;0) and B(6;0)

6.1.2 y-int are (0;-12) and (0;1)

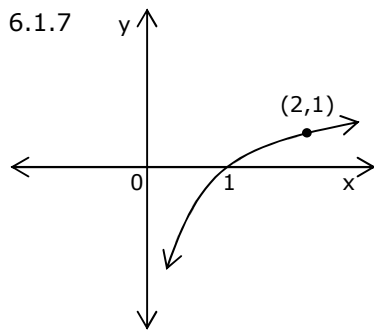
DE = 13 units

6.1.3 (3;8) in $y = a^x$
 $8 = a^3$
 $a = 2$

6.1.4 $-2 < x < 6$

6.1.5 $y = -(2)^x$

6.1.6 $y = \log_2 x$; $x > 0$



7.1.1 180°

7.1.2 6

7.1.3 $[-3; 1]$

7.1.4 $y = 2\cos\left(\frac{1}{2}x\right)$
or $y = 2\cos\left(-\frac{1}{2}x\right)$

8.1

$$A = P(1+i)^n$$

$$3 \times 7860 = 7860 \left(1 + \frac{8,2}{200}\right)^{2n}$$

$$3 = (1,041)^{2n}$$

$$2n \log 1,04 = \log 3$$

$$n = \frac{\log 3}{2 \log 1,04}$$

$$= 14 \text{ years.}$$

8.2.1 Loan = 80% of 266 000
= R 212 800

8.2.2 $P = \frac{x[1-(1+i)^{-n}]}{i}$

$$212800 = \frac{x \left[1 - \left(1 + \frac{14,4}{1200}\right)^{-60}\right]}{\frac{14,4}{1200}}$$

$$212800 \times \frac{14,4}{1200} = x \left[1 - \left(1 + \frac{14,4}{1200}\right)^{-60}\right]$$

$$x = \frac{2553,60}{\left[1 - \left(1 + \frac{14,4}{1200}\right)^{-60}\right]}$$

$$= R4995,72$$

8.2.2 $P = \frac{x[1-(1+i)^{-n}]}{i}$

$$= \frac{4995,72 \left[1 - \left(1 + \frac{14,4}{1200}\right)^{-6}\right]}{\frac{14,4}{1200}}$$

$$= R28754,62$$

9.1

$$f(x) = -3x^2 + 4$$

$$f(x+h) = -3(x+h)^2 + 4$$

$$= -3(x^2 + 2xh + h^2) + 4$$

$$= 3x^2 - 6xh - 3h^2 + 4$$

$$f(x+h) - f(x) = h(-6x - 3h)$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

$$= \lim_{h \rightarrow 0} \frac{h(-6x - 3h)}{h}$$

$$= -6x$$

9.2.1

$$y = x - 2 + \frac{1}{x}$$

$$= x - 2 + x^{-1}$$

$$\frac{dy}{dx} = 1 - x^{-2}$$

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

9.2.2

$$y(1-x) = (1-x)(1+x)$$

$$y = 1+x$$

$$\frac{dy}{dx} = 1$$

10.1.1 $y - \text{int}(0; -7)$

$$x - \text{int}: 2x^3 - 3x^2 - 12x - 7 = 0$$

$$(x+1)(2x^2 - 5x - 7) = 0$$

$$(x+1)(2x-7)(x+1) = 0$$

$$x = -1 \quad \text{or} \quad x = 3\frac{1}{2}$$

10.1.2

$$\frac{dy}{dx} = 6x^2 - 6x - 12 = 0$$

$$x^2 - x - 2 = 0$$

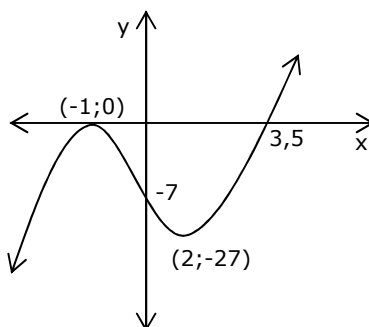
$$(x-2)(x+1) = 0$$

$$x = 2 \quad \text{or} \quad x = -1$$

$$y = -27 \quad \text{or} \quad y = 0$$

$$TP = \{(2; -27); (-1; 0)\}$$

10.1.3



10.1.4

average rate of change

$$= \frac{0+27}{-1-2}$$

$$= -9$$

10.1.5 pt of inflection of f

$$\text{is } x = \frac{-1+2}{2} = \frac{1}{2}$$

$$x = \frac{1}{2} + 2 = 2\frac{1}{2}$$

10.1.6 $k = 0$ or $k = -27$

11.1

$$\text{Area} = \text{Area}_{(\text{base})} + \text{perimeter}_{(\text{base})} \times h$$

$$= 2x^2 + 6xh$$

11.2

$$900 = 2x^2 + 6xh$$

$$6xh = 900 - 2x^2$$

$$h = \frac{900 - 2x^2}{6x}$$

11.3

$$V = l \times b \times h$$

$$= 2x^2 \left(\frac{900 - 2x^2}{6x} \right)$$

$$= x \left(\frac{900 - 2x^2}{3} \right)$$

$$= \frac{900x}{3} - \frac{2x^3}{3}$$

$$= 300x - \frac{2}{3}x^3$$

11.4 for max $V' = 0$

$$300 - 2x^2 = 0$$

$$x^2 = 150$$

$$x = \sqrt{150}$$

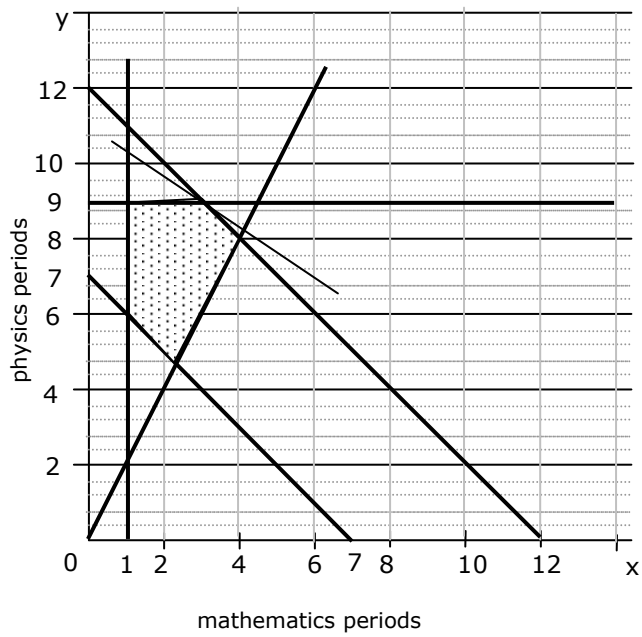
12.1

$$x \geq 1$$

$$1 \leq y \leq 9$$

$$7 \leq x + y \leq 12$$

$$y \geq 2x$$



12.3 No. $(3;5)$ lies outside feasible region.

12.4 $y = -\frac{2}{3}x + 7$

3 Mathematics periods
and 9 physics periods.

12.5 $y = -x + K$

1 Maths and 6 Science OR
2 Maths and 5 Science.