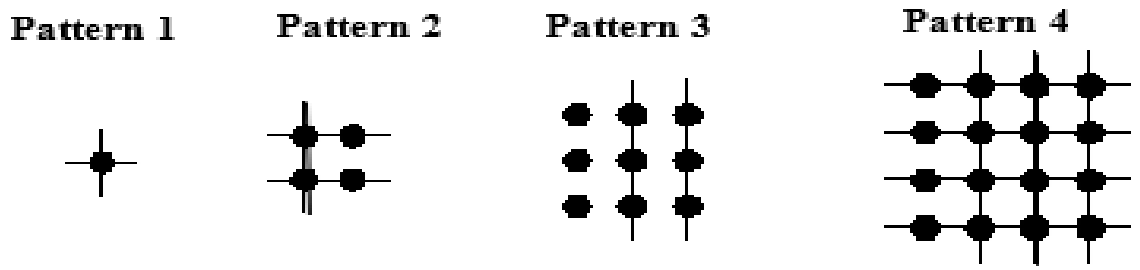
GRADE 11 INFORMAL TEST 1 ANSWERS

MARK THE TEST ACCORDING TO THE MEMO BELOW. THE ANSWERS ARE AFTER EACH QUESTION.

QUESTION 3

3.1 Study the following pattern formed by circles and matches:



3.1.1 Complete the table by writing down the answer next to the number of the question. (4)

Pattern number	1	2	3	4	5
Number of circles	1	4	9	**3.1.1.1**	**3.1.1.2**
Number of matches	4	12	24	**3.1.1.3**	**3.1.1.4**

3.1.2 Write down a formula for the number of circles in the n-th pattern. (1)

3.1.3 Determine the general term (T_n) which represents the number of matches in any pattern. (4)

3.1.4 Which pattern will use 1 104 matches? (4)

QUESTION 3			
3.1.1.1	16	✔16	(1)
3.1.1.2	25	✔25	(1)
3.1.1.3	40	✔40	(1)
3.1.1.4	60	✔60	(1)

3.1.2	$T_n = n^2$	✔$T_n = n^2$	(1)

3.1.3	$(a+b+c=)4 \quad 12 \quad 24 \quad 40 \quad 60$ $(3a+b=)8 \quad 12 \quad 16 \quad 20$ $(2a=) \ 4 \quad 4 \quad 4$ $2a = 4$ $a = 2$ $3a + b = 8$ $3(2) + b = 8$ $6 + b = 8$ $b = 2$ $a + b + c = 4$ $2 + 2 + c = 4$ $4 + c = 4$ $c = 0$ $\therefore T_n = 2n^2 + 2n$	✓ $a = 2$ ✓ $b = 2$ ✓ $c = 0$ ✓ $T_n = 2n^2 + 2n$	

3.1.4	$2n^2 + 2n = 1\,104$ $2n^2 + 2n - 1\,104 = 0$ $n^2 + n - 552 = 0$ $(n - 23)(n + 24) = 0$ $n = 23$ or $n \neq -24$ NA $T_{23} = 1\,104$	✓ $T_n = 1\,104$ ✓Standard form ✓Factors or using of quadratic formula ✓ Choose $n = 23$	(4)

3.2 Calculate: $\frac{3}{2} \times \frac{4}{3} \times \frac{5}{4} \times \ldots\ldots\ldots \times \frac{2\,009}{2\,008} \times \frac{2\,010}{2\,009}$. (2)

3.3 Study the following pattern:

***GRADE*11*GRADE*11*GRADE*11*GRADE*11.....**

Which letter or number will be the 388th term in the pattern? (2)

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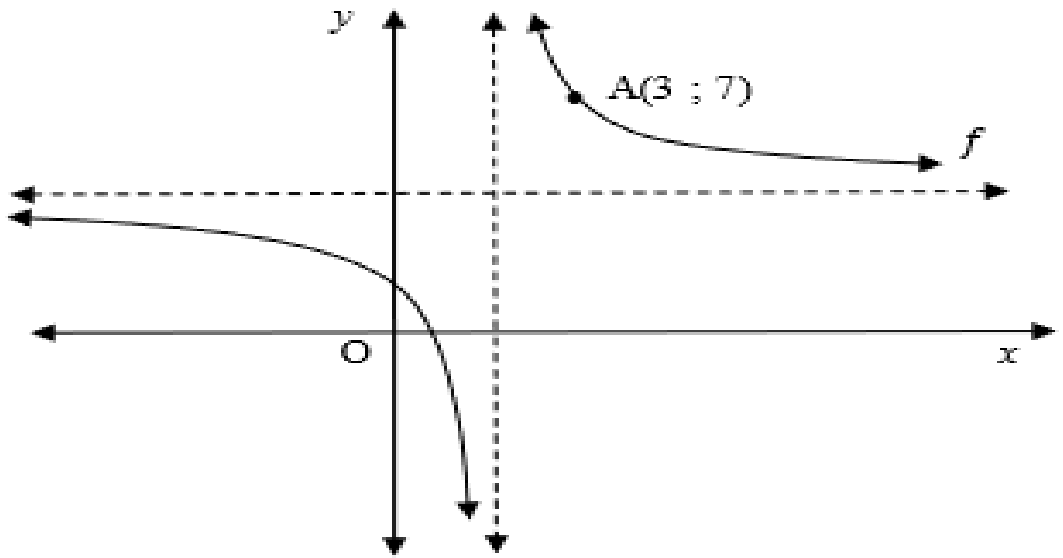
3.2	$\frac{3}{2} \times \frac{4}{3} \times \frac{5}{4} \times \ldots\ldots \times \frac{2\,009}{2\,008} \times \frac{2\,010}{2\,009}$ $= \frac{1}{2} \times \frac{2\,010}{1}$ $= 1\,005$	✓Simplify ✓1 005	(2)
3.3	Given pattern: ***GRADE*11*GRADE*11*GRADE*11.....** *GRADE*11 = 7 letters and numbers $\frac{388}{7} = 55$ with a remainder of 3 This means that we will have 55 *GRADE*11 parts. Counting 3 letters onwards gives an ***A***. ∴ 388th term is a ***A***. **Answer only: full marks**	✓Method ✓***A*** (answer)	(2)
			[17]

QUESTION 6

6.1 The diagram below represents the graph of $f(x) = \frac{p}{x-2} + 4$.

A(3 ; 7) is a point on the graph of f.



6.1.1 Write down the equations of the asymptotes of f. (2)

6.1.2 Show that $p = 3$. (2)

6.1.3 Determine the equation of h which is formed when f is shifted three units downwards and one unit to the left. (2)

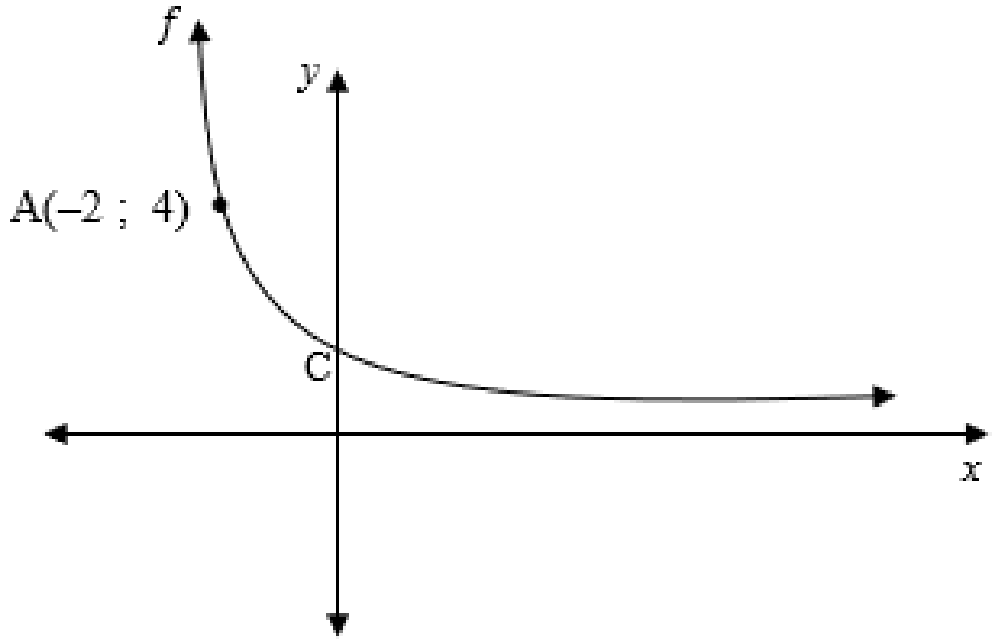
6.1.4 For which value(s) of x is f decreasing? (2)

QUESTION 6

6.1.1	$x = 2$ $y = 4$	✔$x = 2$ ✔$y = 4$	(2)
6.1.2	$(3\ ;\ 7) \quad \therefore 7 = \frac{p}{3-2} + 4$ $7 = p + 4$ $p = 3$	✔Sustitute $x = 3$ and $y = 7$ ✔Simplify	(2)
6.1.3	$h(x) = \frac{3}{x - 2 + \mathbf{1}} + 4 - \mathbf{3}$ $h(x) = \frac{3}{x-1} + 1$	✔$\frac{3}{x-1}$ ✔$+1$	(2)
6.1.4	For $x \in \mathbb{R}\ ;\ x \neq 2$	✔$x \in \mathbb{R}$ ✔$x \neq 2$	(2)

6.2 The diagram shows the graph of $f(x) = a^x$.

The point $A(-2\ ;\ 4)$ lies on the graph. C is the y-intercept of f.



Determine:

6.2.1 the value of a. (2)

6.2.2 the coordinates of C. (2)

6.2.3 the average gradient of the curve between the points A and C. (3)

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6.2.1	$4 = a^{-2}$ $\left(\frac{1}{2}\right)^{-2} = a^{-2}$ $\therefore a = \frac{1}{2}$	✓Method ✓ $a = \frac{1}{2}$	(2)
6.2.2	$C(0\,;1)$	✓$x = 0$ ✓$y = 1$	(2)
6.2.3	$A(-2\,;4)$ and $C(0\,;1)$ Average gradient $= \frac{y_2 - y_1}{x_2 - x_1}$ Average gradient $= \frac{1-4}{0-(-2)}$ Average gradient $= \frac{-3}{2}$	✓Correct formula ✓ Substitute correctly ✓ $\frac{-3}{2}$	(3)
			[15]