Weekly Review #12

Name: _____

1. Consider the function $f(x) = p(0.5)^x + q$ where *p* and *q* are constants. The graph of f(x) passes through the points (0, 6) and (1, 4) and is shown below.



(a) Write down two equations relating p and q.

(2)

(b) Find the value of p and of q.

(2)

(c) Write down the equation of the horizontal asymptote to the graph of f(x). (2) (Total 6 marks)

- 2. Consider the geometric sequence 16, 8, *a*, 2, *b*, ...
 - (a) Write down the common ratio.

(i)

a;

- Write down the value of (b)
 - (ii) *b*. (2)
- The sum of the first *n* terms is 31.9375. Find the value of *n*. (c)

(3) (Total 6 marks)

- Consider the universal set $U = \{x \in \mathbb{N} \mid 3 < x < 13\}$, and the subsets $A = \{$ multiples of $3\}$ 3. and $B = \{4, 6, 12\}$.
 - List the elements of the following sets. (a)
 - (i) Α
 - $A \cap B'$ (ii)
 - (b) Write down one element of $(A \cup B)'$.
 - (c) One of the statements in the table below is false. Indicate with an X which statement is false. Give a reason for your answer.

$n(A \cup B) = 4$	
$15 \in A'$	
$A \subset A \cup B$	

(2) (Total 6 marks)

2

(1)

(2)

started.

(b)

4. (a) Complete the following truth table.

р	q		$p \Rightarrow \neg q$
Т	Т	F	
Т	F	Т	
F	Т	F	
F	F	Т	

Consider the propositions

p: Cristina understands logic q: Cristina will do well on the logic test.

(b) Write down the following compound proposition in symbolic form.

"If Cristina understands logic then she will do well on the logic test"

(2)

(2)

(c) Write down in words the contrapositive of the proposition given in part (b).

(2) (Total 6 marks)

5. A rumour spreads through a group of teenagers according to the exponential model

$$N = 2 \times (1.81)^{0.7t}$$

Write down the number of teenagers who have heard the rumour five hours after it is first

where N is the number of teenagers who have heard the rumour t hours after it is first started.

(a) Find the number of teenagers who started the rumour.

(2)

(c) Determine the length of time it would take for 150 teenagers to have heard the rumour. Give your answer correct to the nearest minute.

- 6. In a television show there is a transparent box completely filled with identical cubes. Participants have to estimate the number of cubes in the box. The box is 50 cm wide, 100 cm long and 40 cm tall.
 - (a) Find the volume of the box.

(2)

- Joaquin estimates the volume of one cube to be 500 cm^3 . He uses this value to estimate the number of cubes in the box.
- (b) Find Joaquin's estimated number of cubes in the box.

(2)

The actual number of cubes in the box is 350.

(c) Find the percentage error in Joaquin's estimated number of cubes in the box.

(2) (Total 6 marks) 7. The following diagrams show six lines with equations of the form y = mx + c.



In the table below there are four possible conditions for the pair of values m and c. Match each of the given conditions with one of the lines drawn above.

Condition	Line
m > 0 and $c > 0$	
m < 0 and $c > 0$	
m < 0 and $c < 0$	
m < 0 and $c < 0$	

(Total 6 marks)

8. The base of a prism is a **regular hexagon**. The centre of the hexagon is O and the length of OA is 15 cm.



diagram not to scale

- (a) Write down the size of angle AOB.
- (b) Find the area of the triangle AOB.

The height of the prism is 20 cm.

(c) Find the volume of the prism.

(2)

(1)

(3)

(Total 6 marks)

9. A manufacturer claims that fertilizer has an effect on the height of rice plants. He measures the height of fertilized and unfertilized plants. The results are given in the following table.

Plant height	Fertilized plants	Unfertilized plants
> 75 cm	115	80
50 – 75 cm	45	65
< 50 cm	20	35

A chi-squared test is performed to decide if the manufacturer's claim is justified at the **1** % level of significance.

(a) Write down the null and alternate hypotheses for this test.

(2)

- (b) For the number of fertilized plants with height greater than 75 cm, show that the expected value is 97.5.(3)
- (c) Write down the value of χ^2_{calc} .
- (2)
- (d) Write down the number of degrees of freedom. (1)
- (e) Write down the critical value of χ^2 , at the **1** % level of significance.
- (f) Is the manufacturer's claim justified? Give a reason for your answer. (2)

10. The temperatures in °C, at midday in Geneva, were measured for eight days and the results are recorded below.

The mean temperature was found to be 7 °C.

(a) Find the value of T.

(b) Write down the mode.

(c) Find the median.

(2) (Total 6 marks)

(3)





(a) Write down the median height of the students.

- (b) Write down the 25^{th} percentile.
- (c) Write down the 75^{th} percentile.

(1)

(1)

The height of the tallest student is 195 cm and the height of the shortest student is 136 cm.

(d) Draw a box and whisker plot on the grid below to represent the heights of the students in the school.



(3) (Total 6 marks)

- 12. The function f(x) is such that f'(x) < 0 for 1 < x < 4. At the point P (4, 2) on the graph of f(x) the gradient is zero.
 - (a) Write down the equation of the tangent to the graph of f(x) at P.
 - (b) State whether f(4) is greater than, equal to or less than f(2).

(2)

(c) Given that f(x) is increasing for $4 \le x < 7$, what can you say about the point P?

(2) (Total 6 marks)

- 14. Bob invests 3000 USD in a bank that offers simple interest at a rate of 4% per annum.
 - (a) Calculate the number of years that it takes for Bob's money to double.

(3)

Charles invests 3000 USD in a bank that offers compound interest at a rate of 3.5% per annum, compounded half-yearly.

(b) Calculate the number of years that it takes for Charles's money to double.

(3) (Total 6 marks)