



**Subject:** Grade 12 Mathematics

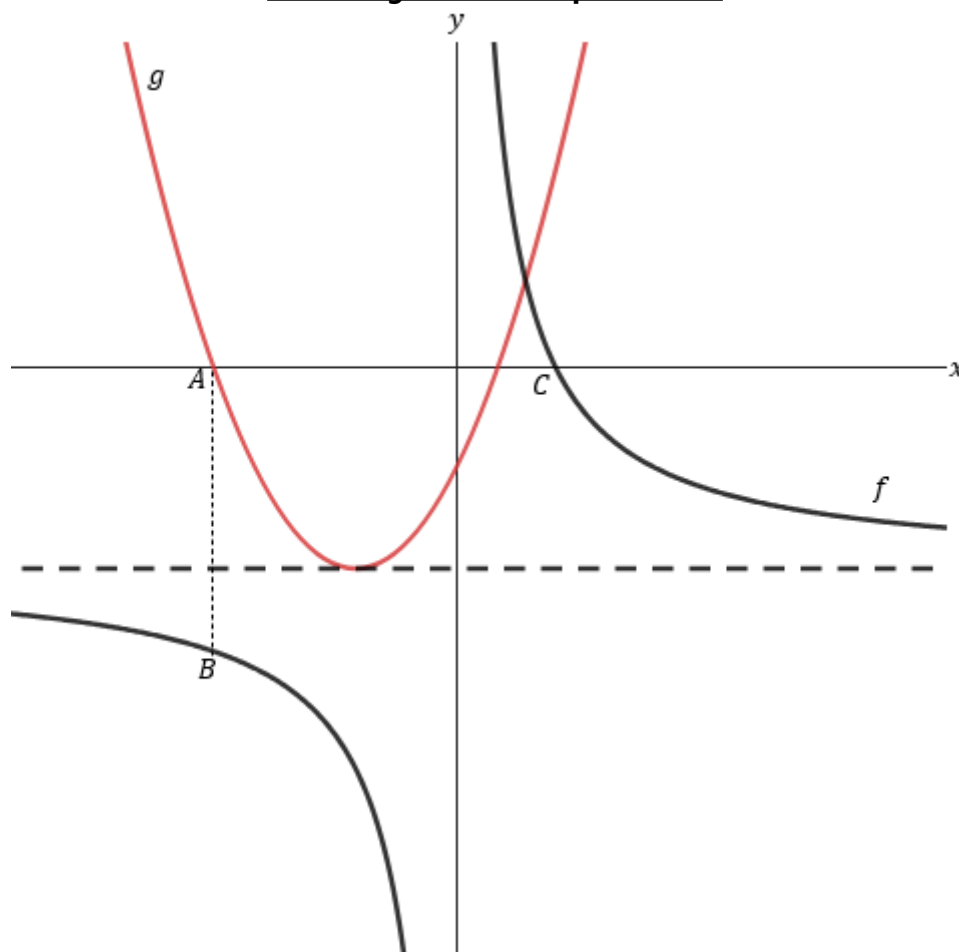
**Topic:** Term 2: Exam 1

**Total:** 129 Marks

**Name:** \_\_\_\_\_

**Date:** \_\_\_\_\_

This image refers to question: 1



**Question 1: Multiple Choice**

4 marks

Given:  $f(x) = \frac{2}{x} + q$  and  $g(x) = (x + 1)^2 - 2$

The turning point of  $g$  lies on the asymptote of  $f$ .

Determine the value of  $q$ .

- |          |          |
|----------|----------|
| <b>A</b> | $q = -1$ |
| <b>B</b> | $q = -2$ |
| <b>C</b> | $q = -3$ |
| <b>D</b> | $q = 1$  |



**Question 2: Text Input**

3 marks

The point  $(-3 ; \frac{1}{27})$  lies on the graph of  $f(x) = b^x$ .

Determine the value of  $b$ .

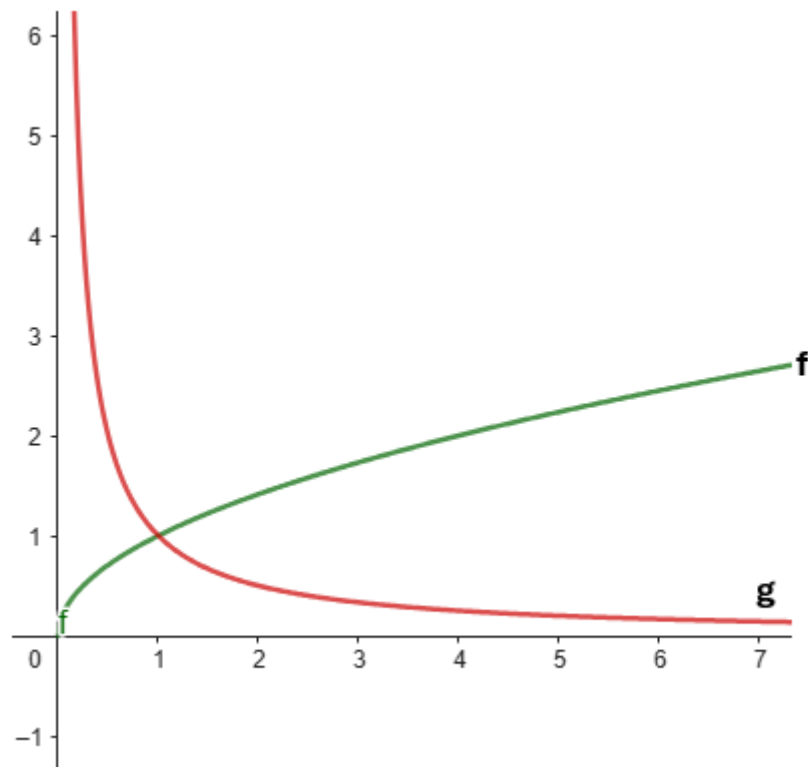
**Question 3: Text Input**

3 marks

The graph of  $f(x) = \log_a x$  passes through the point  $(16 ; 2)$ .

Determine the value of  $a$ .

**This image refers to question: 4**



**Question 4: Multiple Choice**

4 marks

The graphs of  $f(x) = \sqrt{x}$  and  $g(x) = \frac{1}{x}$  for  $x > 0$  are drawn.

The graphs intersect at (1 ; 1).

Determine the values of  $x$  for which  $f^{-1}(x) \leq g(x)$ .

- |          |                |
|----------|----------------|
| <b>A</b> | $x \leq 1$     |
| <b>B</b> | $0 < x \leq 1$ |
| <b>C</b> | $x \geq 1$     |
| <b>D</b> | $x \geq 0$     |

**Question 5: Please Fill In The Blanks**

6 marks

A yo-yo is initially thrown from a height of 2 m. The person throwing the yo-yo does not catch it again, just lets the yo-yo go down and up on its own. Each time it comes up to 90% of the previous height from which it came down.

The height of the fourth drop will be (1) m.

After the fourth drop it will have travelled (2) m.

The total distance travelled before it comes to a stop is (3) m.

Possible Answers: 1,62 | 1,458 | 13,756 | 11,756 | 18 | 36 | 38

|          |  |
|----------|--|
| <b>1</b> |  |
| <b>3</b> |  |

|          |  |
|----------|--|
| <b>2</b> |  |
|----------|--|

**Question 6: Multiple Choice**

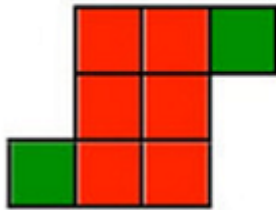
4 marks

Solve for  $x$ , correct to 2 decimal places:

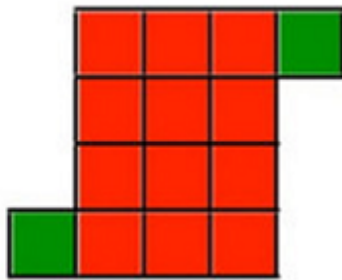
$$-x^2 + 9x = 4$$

- |          |                            |
|----------|----------------------------|
| <b>A</b> | $x = -0,47$ or $x = -8,53$ |
| <b>B</b> | $x = 0,47$ or $x = 8,53$   |
| <b>C</b> | $x = 0,42$ or $x = -9,42$  |
| <b>D</b> | $x = -0,42$ or $x = 9,42$  |

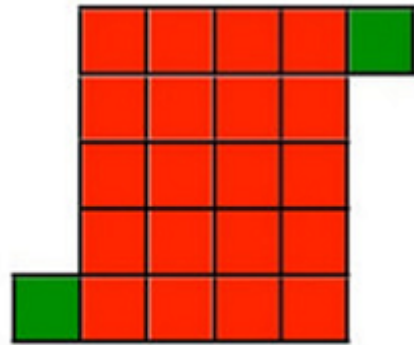
This image refers to question: 7



Figuur 1



Figuur 2



Figuur 3

**Question 7: Text Input**

3 marks

Consider the figure alongside made up of red and green squares.

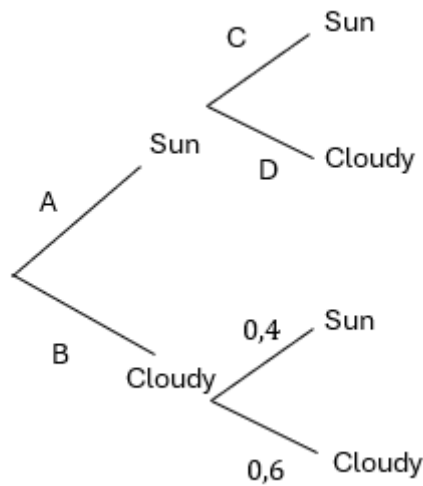
Determine the number of red squares in figure 20.

**Question 8: Text Input**

3 marks

Determine the sum of the series  $2 + \frac{7}{2} + 5 + \dots + \frac{61}{2}$ .

**This image refers to question: 9**



**Question 9: Please Fill In The Blanks**

10 marks

The probability of sunshine tomorrow, if it is sunshine today, is 0,8.

The probability of sunshine tomorrow, if it is cloudy today, is 0,4.

If it is sunshine today, fill in the missing pieces of information on the tree diagram for the next 2 days.

$A = (1)$  .

$B = (2)$  .

$C = (3)$  .

$D = (4)$  .

The probability of the 2 days of sunshine after today is (5) .

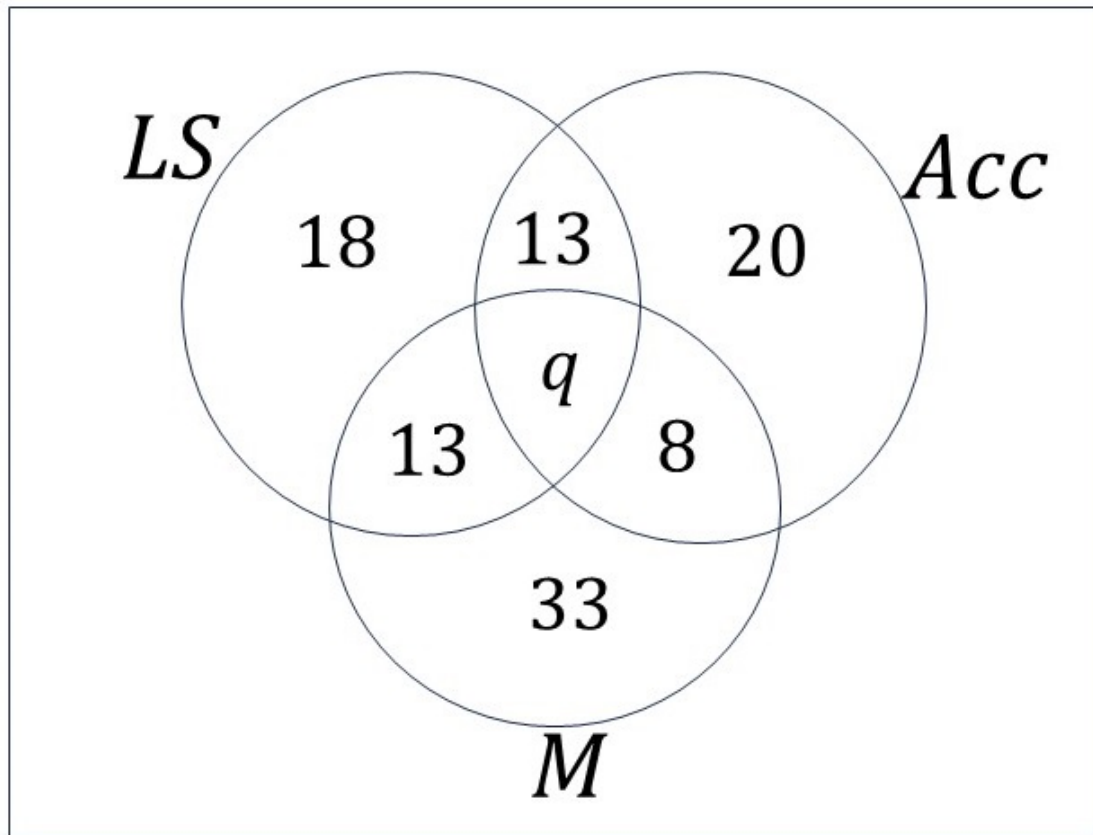
Possible Answers: 0,2 | 0,4 | 0,6 | 0,8 | 0,32 | 0,64

|          |  |
|----------|--|
| <b>1</b> |  |
| <b>3</b> |  |
| <b>5</b> |  |

|          |  |
|----------|--|
| <b>2</b> |  |
| <b>4</b> |  |

**This image refers to question: 10**

# Grade 11 learners



## Question 10: Multiple Choice

4 marks

There are 135 grade 11 students in a school.

All the students take one of the subjects or a combination of Accounting, Mathematics and Life Sciences.

Study the diagram and answer the question.

What is the probability when a student is chosen at random that the student takes all three subjects?

- |          |                  |
|----------|------------------|
| <b>A</b> | 30               |
| <b>B</b> | 34               |
| <b>C</b> | $\frac{2}{9}$    |
| <b>D</b> | $\frac{34}{135}$ |

**Question 11: Text Input**

3 marks

Jason wants to invest money so that he will have enough to withdraw R50 000 in two years' time and a further R30 000 three years later. The interest on the investment is 8,25% compounded monthly.

How much should Jason invest?

|  |
|--|
|  |
|--|

**This image refers to question: 12**

|             | Blue Eyes | Eyes Not Blue | Totals |
|-------------|-----------|---------------|--------|
| Blonde Hair | 95        | 45            | 140    |
| Brown Hair  | 80        | 30            | 110    |
| Totals      | 175       | 75            | 250    |

**Question 12: Please Fill In The Blanks**

8 marks

Study the contingency table alongside:

The sample space is (1) people.

The probability that a person has brown hair is (2) .

The probability that a person has blue eyes is (3) .

Brown hair and blue eyes are (4) events.

Possible Answers: 250 | 175 | independent | not independent | 11/25 | 7/10 | 110

|          |  |
|----------|--|
| <b>1</b> |  |
| <b>3</b> |  |

|          |  |
|----------|--|
| <b>2</b> |  |
| <b>4</b> |  |

**Question 13: Multiple Choice**

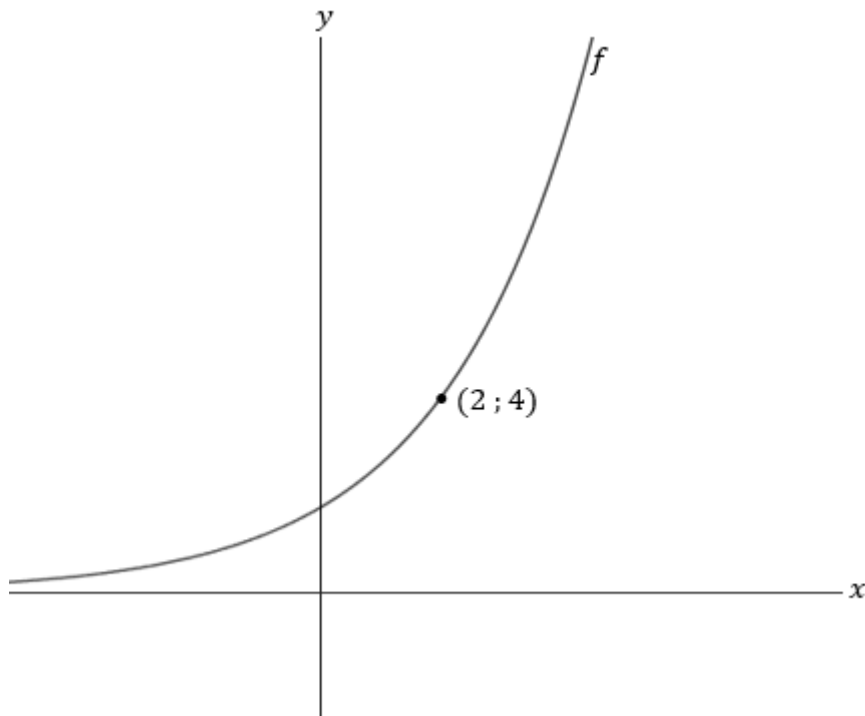
4 marks

Solve for  $x$ :

$$4^x + 16 = 10 \cdot 2^x$$

- |          |                      |
|----------|----------------------|
| <b>A</b> | $x = -2$ or $x = -8$ |
| <b>B</b> | $x = 2$ or $x = 8$   |
| <b>C</b> | $x = -1$ or $x = 3$  |
| <b>D</b> | $x = 1$ or $x = 3$   |

**This image refers to question: 14**



**Question 14: Please Fill In The Blanks**

6 marks

The graph alongside,  $f(x) = b^x$ , passes through the point (2 ; 4).

The value of  $b$  is (1) .

The inverse of  $f$  is  $f^{-1}(x) = (2)$  .

The domain of  $f^{-1}(x)$  is (3) .

Possible Answers: -2 | 2 |  $(1/2)^x$  |  $\log_2 x$  |  $-\log_2 x$  |  $x > 0$  |  $y > 0$  |  $x \in \mathbb{R}$

|          |  |
|----------|--|
| <b>1</b> |  |
| <b>3</b> |  |

|          |  |
|----------|--|
| <b>2</b> |  |
|----------|--|

**Question 15: Multiple Choice**

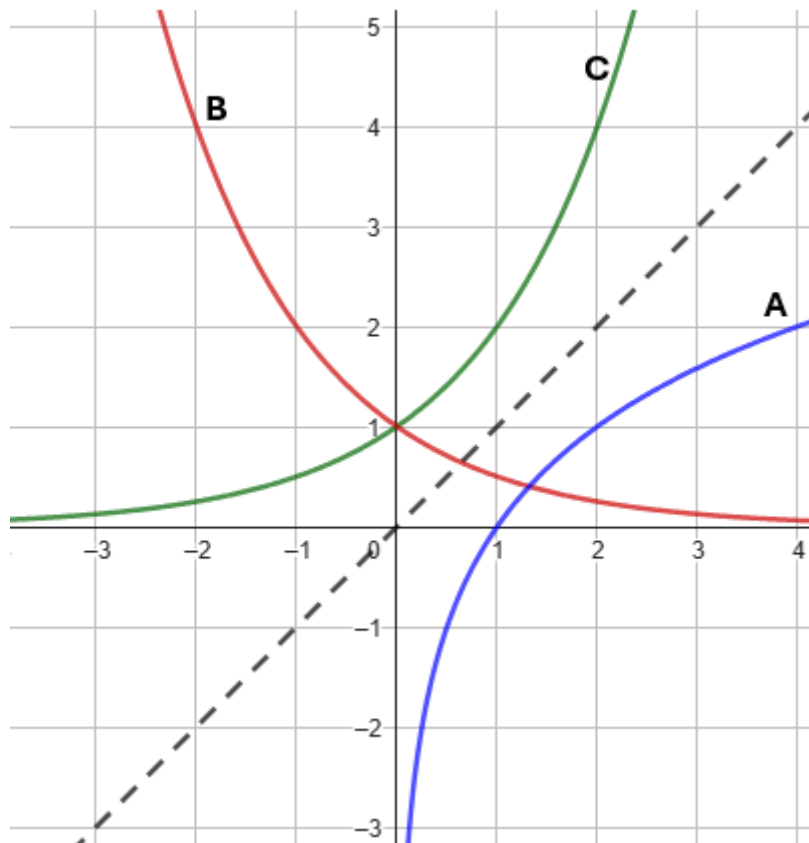
4 marks

Given:  $g(x) = \left(\frac{1}{2}\right)^x$

Determine the equation of  $h$ , the reflection of  $g$  in the  $y$ -axis.

- |          |                                      |
|----------|--------------------------------------|
| <b>A</b> | $h(x) = 2^x$                         |
| <b>B</b> | $h(x) = \log_2 x$                    |
| <b>C</b> | $h(x) = \log_{\frac{1}{2}} x$        |
| <b>D</b> | $h(x) = -\left(\frac{1}{2}\right)^x$ |
-

**This image refers to question: 16**



**Question 16: Please Fill In The Blanks**

8 marks

Study the diagram alongside:

- Graph  $A$  is the inverse of graph (1) .
- Graph  $B$  is a reflection of graph (2) over the  $y$ -axis.
- Graph (3) is a decreasing function.
- Graph (4) has a domain  $x \in (0 ; \infty)$ .

Possible Answers: A | B | C

|          |  |
|----------|--|
| <b>1</b> |  |
| <b>3</b> |  |

|          |  |
|----------|--|
| <b>2</b> |  |
| <b>4</b> |  |

**Question 17: Please Fill In The Blanks**

8 marks

Consider the following expression:

$$\frac{\sqrt{3}}{\sqrt{3}-1} - \frac{2}{\sqrt{3}}$$

To add fractions, the first step would be to (1) .

After simplifying the first step, the numerator of the expression can be expressed as (2) .

To rationalise the denominator, we multiply by (3) .

The simplified answer to the expression is (4) .

Possible Answers: the conjugate | rationalise the denominator | choose the lowest common denominator |

 $5 + \sqrt{3}$  |  $5 - 2\sqrt{3}$  |  $(9 - \sqrt{3})/6$  |  $(3 + \sqrt{3})/2$ 

|          |  |
|----------|--|
| <b>1</b> |  |
| <b>3</b> |  |

|          |  |
|----------|--|
| <b>2</b> |  |
| <b>4</b> |  |

**Question 18: Text Input**

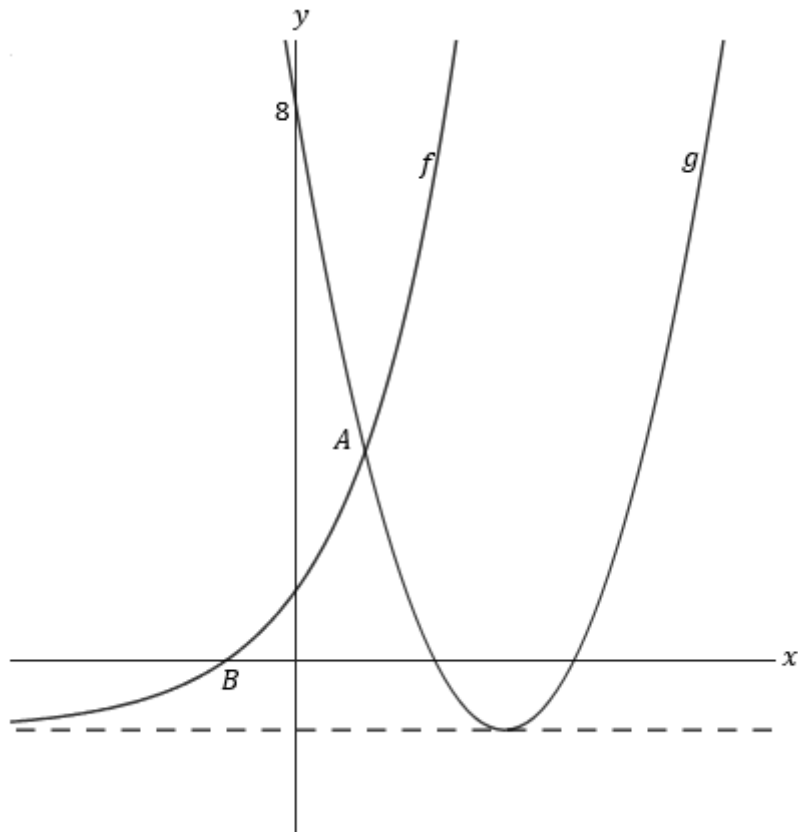
3 marks

Determine the greatest value of  $p$  for which the series  $\sum_{k=1}^p (2k - 1) < 400$  .

Give the answer as a number only.

|  |
|--|
|  |
|--|

**This image refers to question: 19**



**Question 19: Text Input**

4 marks

Given:  $f(x) = 2 \cdot 2^x - 1$

$$g(x) = x^2 + bx + 8$$

The turning point of  $g$  lies on the asymptote of  $f$ .

The axis of symmetry of  $g$  is  $x = 3$ .

Determine  $A$ , the point of intersection of  $f$  and  $g$ .

Give the answer in the form  $(a; b)$

**Question 20: Text Input**

3 marks

Solve for  $x$ :

$$\sqrt{x+2} + 4 = x$$

Give the answer in the form:  $x = \dots$ **Question 21: Multiple Choice**

4 marks

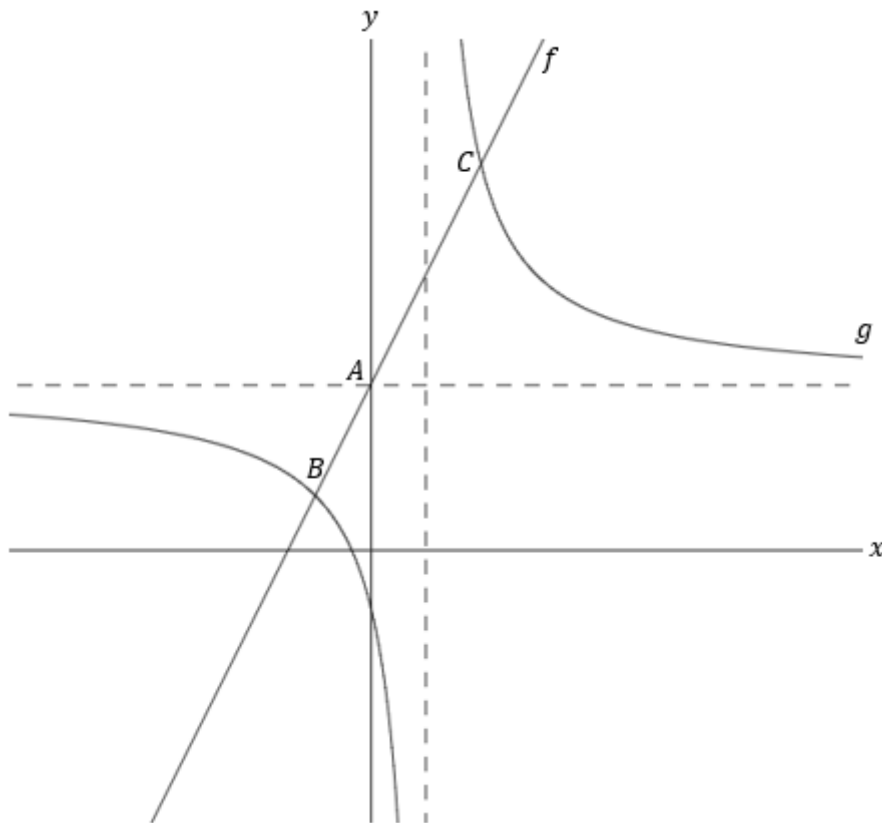
Consider the geometric sequence given:

$$-1 ; -k ; k - 6 ; \dots$$

Determine the value(s) of  $k$ :

- |          |                     |
|----------|---------------------|
| <b>A</b> | $k = -3$            |
| <b>B</b> | $k = 2$             |
| <b>C</b> | $k = -3$ or $k = 2$ |
| <b>D</b> | $k = 3$ or $k = -2$ |

**This image refers to question: 22**



**Question 22: Please Fill In The Blanks**

4 marks

$$f(x) = 2x + 3 \text{ and } g(x) = \frac{4}{x-1} + q$$

The horizontal asymptote of  $g$  goes through  $A$ , the  $y$ -intercept of  $f$ .

The value of  $q$  is (1) .

The coordinates of  $B$  are (2) .

Possible Answers: 2 | (2 ; 7) | -3 | 3 | (-1 ; 1) | (-1 ; 2)

|          |  |
|----------|--|
| <b>1</b> |  |
|----------|--|

|          |  |
|----------|--|
| <b>2</b> |  |
|----------|--|

**Question 23: Multiple Choice**

4 marks

Given:  $f(x) = 2x - 3$ Determine the equation of  $f^{-1}(x)$ .

- |          |                               |
|----------|-------------------------------|
| <b>A</b> | $f^{-1}(x) = 2$               |
| <b>B</b> | $f^{-1}(x) = 2y - 3$          |
| <b>C</b> | $f^{-1}(x) = \frac{x+3}{2}$   |
| <b>D</b> | $f^{-1}(x) = \frac{x}{2} + 3$ |
- 

**Question 24: Multiple Choice**

4 marks

The third term of an arithmetic sequence is 7 and the twelfth term is 25. Determine the sum of the first 30 terms.

- |          |     |
|----------|-----|
| <b>A</b> | 930 |
| <b>B</b> | 900 |
| <b>C</b> | 960 |
| <b>D</b> | 61  |
- 

**Question 25: Please Fill In The Blanks**

6 marks

Evaluate:  $\sum_{k=2}^4 (2^k - 1)$ 

The first three terms of the series are (1) .

There are (2) terms in the series.

The value of the series is (3) .

Possible Answers: 4 | 2 + 3 + 4 | 3 + 7 + 15 | 3 | 9 | 25 | 56

|          |  |
|----------|--|
| <b>1</b> |  |
| <b>3</b> |  |

|          |  |
|----------|--|
| <b>2</b> |  |
|----------|--|

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**Question 26: Please Fill In The Blanks**

4 marks

A nominal rate of 11,2% compounded monthly is an effective rate of (1) per annum.

An effective rate of 13% per annum is a nominal rate of (2) compounded quarterly.

Round answers to one decimal place.

Possible Answers: 12,4% | 11,7% | 11,8% | 12,2%

|   |  |
|---|--|
| 1 |  |
|---|--|

|   |  |
|---|--|
| 2 |  |
|---|--|

**Question 27: Text Input**

4 marks

If  $P(A) = 0,45$ ,  $P(B) = 0,65$  and  $P(A \cup B) = 0,9$ ,

determine  $P(A \cap B)$ .

|  |
|--|
|  |
|--|

**Question 28: Please Fill In The Blanks**

4 marks

Consider the following expression:

$$\frac{\sqrt{x^2 + 4x - 5}}{x - 6}$$

For which value(s) of  $x$  will the expression be:

- a. real (1) .
- b. undefined (2) .

Possible Answers:  $x = 6$  |  $x \neq 6$  |  $x \leq -5$  or  $x \geq 4$  ;  $x \neq 6$  |  $-5 \leq x \leq 4$  |  $-5 \geq x$  ,  $x \leq 4$  ;  $x = 6$

|   |  |
|---|--|
| 1 |  |
|---|--|

|   |  |
|---|--|
| 2 |  |
|---|--|

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**Total: 129 Marks**