GR 10 MATHS – EXAM QUESTION PAPERS

Q 1

NATIONAL EXEMPLAR PAPER 1

Clearly show ALL calculations, diagrams, graphs, etc. that you have used in determining your answers.

Answers only will NOT necessarily be awarded full marks.

You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.

*If necessary, round off answers to **TWO** decimal places, unless stated otherwise.*

▶ ALGEBRA [32]

QUESTION 1

1.1 Simplify the following expressions fully:

1.1.1 $(m - 2n)(m^2 - 6mn - n^2)$ (3)

1.1.2 $\dfrac{x^3 + 1}{x^2 - x + 1} - \dfrac{4x^2 - 3x - 1}{4x + 1}$ (5)

1.2 Factorise the following expressions fully:

1.2.1 $6x^2 - 7x - 20$ (2)

1.2.2 $a^2 + a - 2ab - 2b$ (3)

1.3 Determine, **without the use of a calculator**, between which two consecutive integers $\sqrt{51}$ lies. (2)

1.4 Prove that $0,2\dot{4}\dot{5}$ is rational. (4) [19]

QUESTION 2

2.1 Determine, **without the use of a calculator**, the value of x in each of the following:

2.1.1 $x^2 - 4x = 21$ (3)

2.1.2 $96 = 3x^{\frac{5}{4}}$ (3)

2.1.3 $R = \dfrac{2\sqrt{x}}{3S}$ (2)

2.2 Solve for p and q simultaneously if:

$6q + 7p = 3$

$2q + p = 5$ (5) [13]

▶ NUMBERS & NUMBER PATTERNS [11]

QUESTION 3

3.1 $3x + 1$; $2x$; $3x - 7$ ….. are the first three terms of a linear number pattern.

3.1.1 If the value of x is three, write down the FIRST THREE terms. (3)

3.1.2 Determine the formula for T_n, the general term of the sequence. (2)

3.1.3 Which term in the sequence is the first to be less than -31? (3)

3.2 The multiples of three form the number pattern:
3 ; 6 ; 9 ; 12 ; . . .

Determine the 13th number in this pattern that is even. (3) [11]

▶ FINANCE & GROWTH [14]

QUESTION 4

4.1 Thando has R4 500 in his savings account. The bank pays him a compound interest rate of 4,25% p.a. Calculate the amount Thando will receive if he decides to withdraw the money after 30 months. (3)

4.2 The following advertisement appeared with regard to buying a bicycle on a hire-purchase agreement loan:

Purchase price	R5 999
Required deposit	R600
Loan term	Only 18 months, at 8% p.a. simple interest

4.2.1 Calculate the monthly amount that a person has to budget for in order to pay for the bicycle. (6)

4.2.2 How much interest does one have to pay over the full term of the loan? (1)

4.3 The following information is given:

1 ounce = 28,35 g
$1 = R8,79

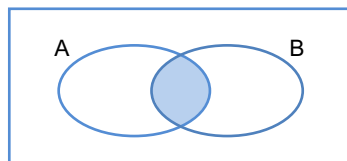Calculate the rand value of a 1 kg gold bar, if 1 ounce of gold is worth $978,34. (4) [14]

EXAM PAPERS: PAPER 1

▶ **PROBABILITY [13]**
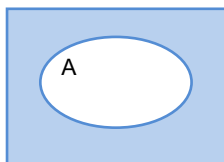
QUESTION 5

5.1 What expression BEST represents the shaded area of the following Venn diagrams?

5.1.1

(1)

5.1.2

(1)

5.2 State which of the following sets of events is mutually exclusive:

A Event 1: The learners in Grade 10 in the swimming team

Event 2: The learners in Grade 10 in the debating team

B Event 1: The learners in Grade 8

Event 2: The learners in Grade 12

C Event 1: The learners who take Mathematics in Grade 10

Event 2: The learners who take Physical Sciences in Grade 10   (1)

5.3 In a class of 40 learners the following information is TRUE:

- 7 learners are left-handed
- 18 learners play soccer
- 4 learners play soccer and are left-handed
- All 40 learners are either right-handed or left-handed

Let L be the set of all left-handed people and S be the set of all learners who play soccer.

5.3.1 How many learners in the class are right-handed and do NOT play soccer?   (1)

5.3.2 Draw a Venn diagram to represent the above information.   (4)

5.3.3 Determine the probability that a learner is:

(a) left-handed or plays soccer   (3)

(b) right-handed and plays soccer   (2) [13]

▶ **FUNCTIONS & GRAPHS [30]**

QUESTION 6

Given: $f(x) = \dfrac{3}{x} + 1$ and $g(x) = -2x - 4$

6.1 Sketch the graphs of f and g on the same set of axes.   (4)

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

6.3 Write down the domain of f.   (2)

6.4 Solve for x if $f(x) = g(x)$.   (5)

6.5 Determine the values of x for which $-1 \le g(x) < 3$.   (3)

6.6 Determine the y-intercept of k if $k(x) = 2g(x)$ (2)

6.7 Write down the coordinates of the x- and y-intercepts of h if h is the graph of g reflected about the y-axis.   (2) [20]

QUESTION 7

The graph of $f(x) = ax^2 + q$ is sketched below.
Points A(2; 0) and B(-3; 2,5) lie on the graph of f.
Points A and C are x-intercepts of f.
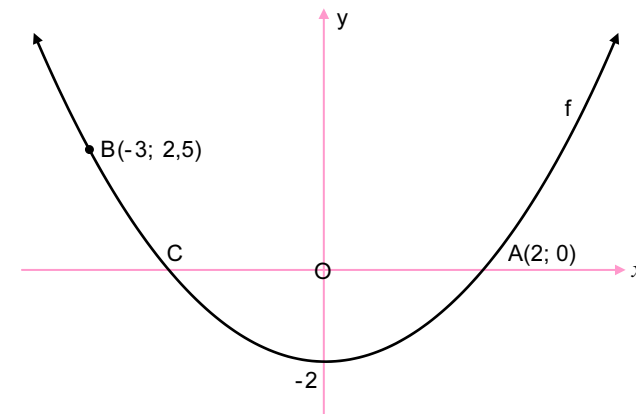
7.1 Write down the coordinates of C.   (1)

7.2 Determine the equation of f.   (3)

7.3 Write down the range of f.   (1)

7.4 Write down the range of h, where $h(x) = -f(x) - 2$.   (2)

7.5 Determine the equation of an exponential function, $g(x) = b^x + q$, with range $y > -4$ and which passes through the point A.   (3) [10]

TOTAL: 100

NATIONAL EXEMPLAR PAPER 2

Clearly show ALL calculations, diagrams, graphs, etc. which you have used in determining the answers.

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▶ STATISTICS [15]

QUESTION 1

A baker keeps a record of the number of scones that he sells each day. The data for 19 days is shown below.

31	36	62	74	65	63	60	34	46	56
37	46	40	52	48	39	43	31	66	

1.1 Determine the mean of the given data. (2)

1.2 Rearrange the data in ascending order and then determine the median. (2)

1.3 Determine the lower and upper quartiles for the data. (2)

1.4 Draw a box and whisker diagram to represent the data. (2) [8]

We trust that working through these exam papers and following our detailed answers and comments will help you prepare thoroughly for your final exam.

The Answer Series Maths study guides offer a key to exam success. In particular, Gr 10 Maths 3 in 1 provides superb foundation in the major topics in Senior Maths.

QUESTION 2

Traffic authorities are concerned that heavy vehicles (trucks) are often overloaded. In order to deal with this problem, a number of weighbridges have been set up along the major routes in South Africa. The gross (total) vehicle mass is measured at these weigh bridges. The histogram below shows the data collected at a weighbridge over a month.

Histogram showing Gross Vehicle Mass
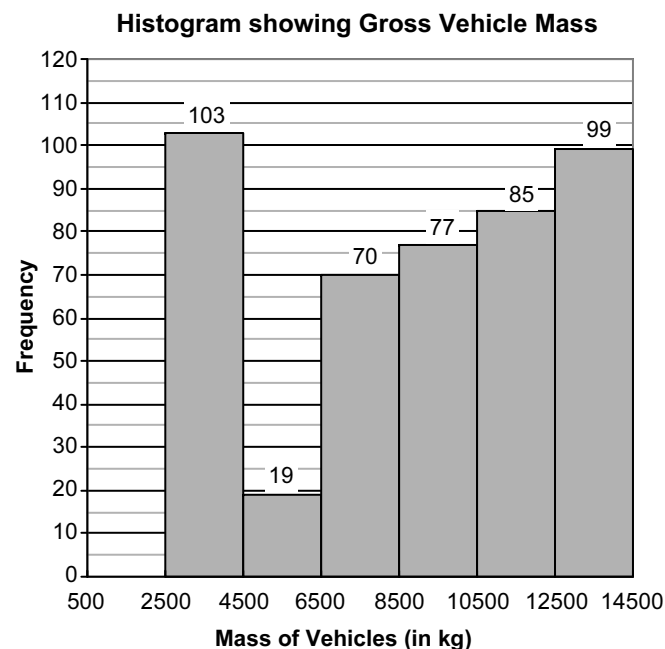
2.1 Write down the modal class of the data. (1)

2.2 Estimate the mean gross vehicle mass for the month. (5)

2.3 Which of the measures of central tendency, the modal class or the estimated mean, will be most appropriate to describe the data set? Explain your choice. (1) [7]
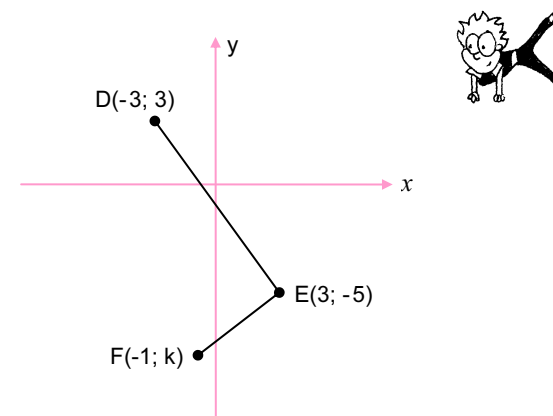
▶ ANALYTICAL GEOMETRY [18]

QUESTION 3

3.1 In the diagram below, D(-3; 3), E(3; -5) and F(-1; k) are three points in the Cartesian plane.

  3.1.1 Calculate the length of DE. (2)

  3.1.2 Calculate the gradient of DE. (2)

  3.1.3 Determine the value of k if $D\hat{E}F = 90º$. (4)

  3.1.4 If k = -8, determine the coordinates of M, the midpoint of DF. (2)

  3.1.5 Determine the coordinates of a point G such that the quadrilateral DEFG is a rectangle. (4)

3.2 C is the point (1; -2). The point D lies in the second quadrant and has coordinates (x; 5).

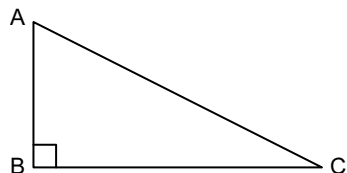 If the length of CD is $\sqrt{53}$ units, calculate the value of x. (4) [18]

Q 2

▶ TRIGONOMETRY [36]

QUESTION 4

4.1 In the diagram below, ∆ABC is right-angled at B.
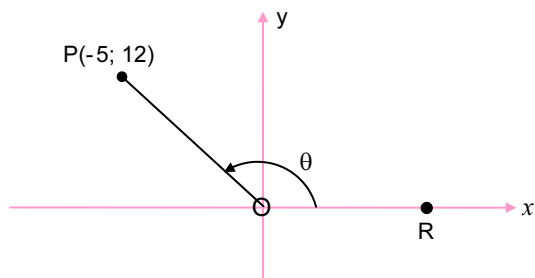
A
B C

Complete the following statements:

4.1.1 $\sin C = \dfrac{AB}{\ldots}$ (1)

4.1.2 $\ldots A = \dfrac{AB}{BC}$ (1)

4.2 **Without using a calculator**, determine the

value of: $\dfrac{\sin 60° \,.\, \tan 30°}{\sec 45°}$ (4)

4.3 In the diagram, P(-5; 12) is a point in the

Cartesian plane and $R\hat{O}P = \theta$.

P(-5; 12)

y

θ

O

R

x

Determine the value of:

4.3.1 $\cos \theta$ (3)

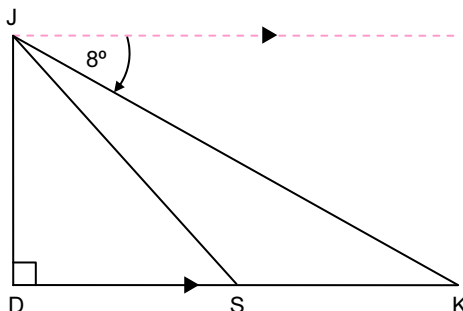4.3.2 $\operatorname{cosec}^2 \theta + 1$ (3) [12]

QUESTION 5

5.1 Solve for x, correct to ONE decimal place, in each of the following equations where $0° \le x < 90°$.

5.1.1 $5 \cos x = 3$ (2)

5.1.2 $\tan 2x = 1{,}19$ (3)

5.1.3 $4 \sec x - 3 = 5$ (4)

5.2 An aeroplane at J is flying directly over a point D on the ground at a height of 5 kilometres. It is heading to land at point K. The angle of depression from J to K is 8°. S is a point along the route from D to K.

J

8°

D S K

5.2.1 Write down the size of $J\hat{K}D$. (1)

5.2.2 Calculate the distance DK, correct to the nearest metre. (3)

5.2.3 If the distance SK is 8 kilometres, calculate the distance DS. (1)

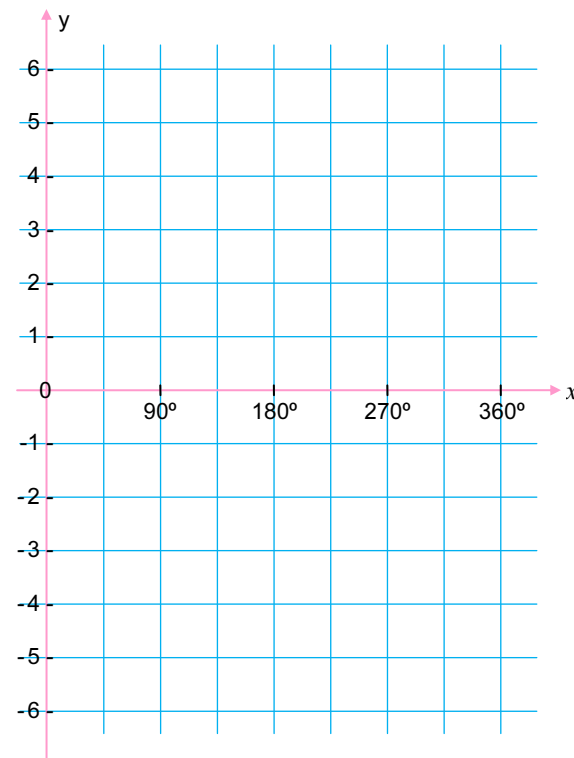5.2.4 Calculate the angle of elevation from point S to J, correct to ONE decimal place. (2) [16]

QUESTION 6

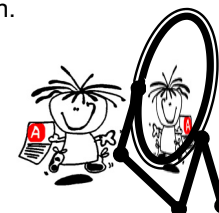6.1 Consider the function $y = 2 \tan x$.

6.1.1 Make a neat sketch of $y = 2 \tan x$ for $0° \le x \le 360°$ on the axes provided below.

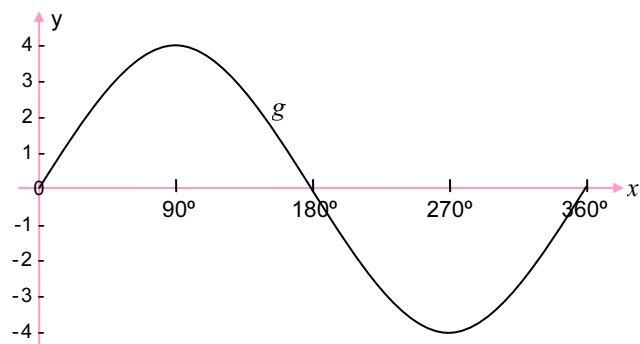Clearly indicate on your sketch the intercepts with the axes and the asymptotes.

y

6
5
4
3
2
1
0
90° 180° 270° 360°
x
-1
-2
-3
-4
-5
-6

(4)

6.1.2 If the graph of $y = 2 \tan x$ is reflected about the x-axis, write down the equation of the new graph obtained by this reflection. (1)

## 6.2 The diagram below shows the graph of $g(x) = a \sin x$ for $0° \le x \le 360°$.

6.2.1 Determine the value of a. (1)

6.2.2 If the graph of g is translated 2 units upwards to obtain a new graph h, write down the range of h. (2) **[8]**

▶ MEASUREMENT [12]

QUESTION 7

7.1 The roof of a canvas tent is in the shape of a right pyramid having a perpendicular height of 0,8 metres on a square base. The length of one side of the base is 3 metres.
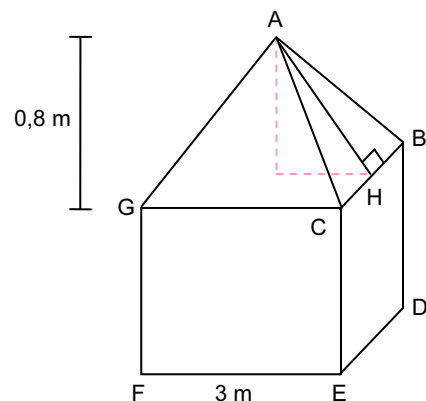
7.1.1 Calculate the length of AH. (2)

7.1.2 Calculate the surface area of the roof. (2)

7.1.3 If the height of the walls of the tent is 2,1 metres, calculate the total amount of canvas required to make the tent if the floor is excluded. (2)

7.2 A metal ball has a radius of 8 millimetres.

7.2.1 Calculate the volume of metal used to make this ball, correct to TWO decimal places.

> The volume of a sphere = $\frac{4}{3}\pi r^3$

(2)

7.2.2 If the radius of the ball is doubled, write down the ratio of

the new volume : the original volume. (2)

7.2.3 You would like this ball to be silver plated to a thickness of 1 millimetre.
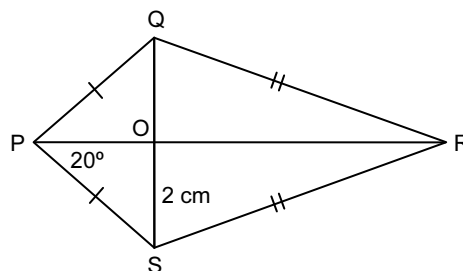
What is the volume of silver required?

Give your answer correct to TWO decimal places. (2) **[12]**

▶ EUCLIDIAN GEOMETRY [19]

Give reasons for your statements in the answers to QUESTIONS 8 and 9.

QUESTION 8

PQRS is a kite such that the diagonals intersect in O. OS = 2 cm and $\hat{OPS} = 20°$.

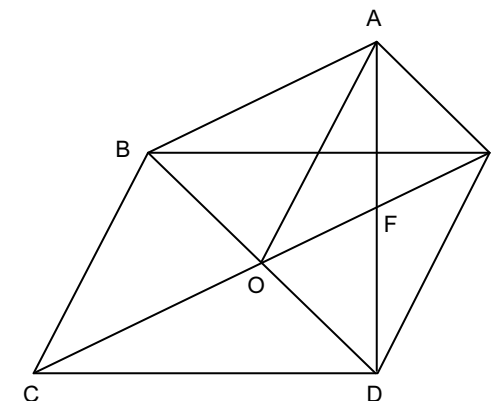**8.1** Write down the length of OQ. (2)

8.2 Write down the size of $\hat{POQ}$. (2)

8.3 Write down the size of $\hat{QPS}$. (2) **[6]**

QUESTION 9

In the diagram, BCDE and AODE are parallelograms.

9.1 Prove that OF || AB. (4)

9.2 Prove that ABOE is a parallelogram. (4)

9.3 Prove that ΔABO ≡ ΔEOD. (5) **[13]**

TOTAL: 100