KING DAVID HIGH SCHOOL LINKSFIELD

MATHEMATICS PAPER 1
GRADE 11 FINAL EXAMINATIONS
NOVEMBER 2014

Total: 120 marks
Reading Time: 10 minutes **Writing Time: $2\frac{1}{2}$ Hours**

NAME:

This paper contains **6** pages (including this cover).
Check that your paper is complete.

Please read the following instructions carefully:

1. Answer all questions on A4 paper.
2. Pay careful attention to time management and mark allocation.
3. Write legibly and not in pencil.
4. Calculators may be used unless otherwise instructed.
5. All necessary calculations must be clearly shown. You will **NOT** receive full credit if you only write down the answers and show no working out.
6. This examination comprises two sections – Section A and Section B

Section A	**1** [18]	**2** [6]	**3** [6]	**4** [13]	**5** [9]	**6** [8]	
60							
Section B	**7** [12]	**8** [12]	**9** [6]	**10** [11]	**11** [11]	**12** [8]	
60							

Total _____
120

= %

SECTION A

QUESTION 1

Solve for x:

a) $(x - 1)(x - 2) = 6$ (3)

b) $x - 7 - \sqrt{x - 5} = 0$ (6)

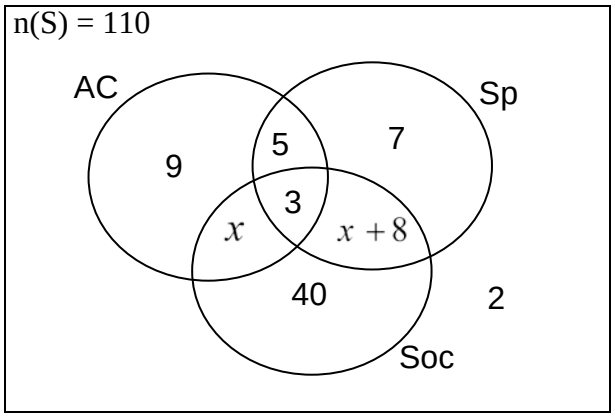
c) $2^{x-2} \cdot \sqrt{2^x} = 32\sqrt{2}$ (4)

d) $4\left(2^x\right) + 3 = \frac{1}{2^x}$ (5)

[18]

QUESTION 2

A group of 110 King Davidians was asked how they spent their leisure time. Three main activities were surveyed: pupils who participate in some form of Arts and Culture (AC) or participate in some sporting activity (Sp) or socialise with friends (Soc).



a) Show that the value of x = 18 (2)

b) How many pupils enjoy playing some type of sport and also enjoy socialising with their friends? (1)

c) Find the probability that a pupil chosen at random only enjoys participating in arts and cultural activities? (2)

d) Find the probability that a pupil chosen at random enjoys arts and cultural activities but does not enjoy participating in sport? (1)

[6]

QUESTION 3

Sivan inherited R 50 000 and is advised to invest it for three years until her 21st birthday. The investment account offers her 8% p.a. compound interest compounded quarterly.

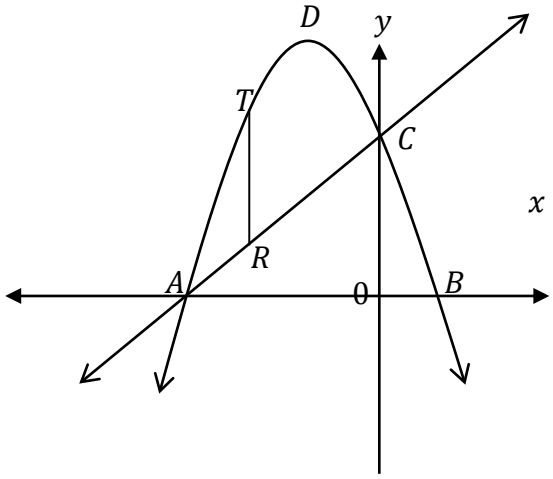
a) How much would she have accumulated by her 21st birthday? (3)

b) What is the effective annual interest rate, correct to 2 decimal places, that Sivan received each year? (3)

[6]

QUESTION 4

Sketches of the graphs of $y = -x^2 - 2x + 3$ and $y = mx + c$ intersect at A and C, as shown in the sketch below. The graphs are NOT drawn to scale.



a) Determine the lengths of OA, OB and OC. (5)
b) Calculate the coordinates of D, the turning point of the parabola. (4)
c) Determine the values of m and c. (2)
d) TR is parallel to the y-axis with T on the parabola and R on the straight line. Determine an expression for TR in terms of x. (2)
[13]

QUESTION 5

a) The times taken, in minutes, for a group of 10 athletes to complete a 5 kilometre race are given below:

17	27	24	35	29	16	38	22	23	26

i) Calculate the mean time taken to complete the race. (2)
ii) Calculate the standard deviation correct to two decimal places. (2)
iii) How many athletes completed the race within one standard deviation of the mean. (2)

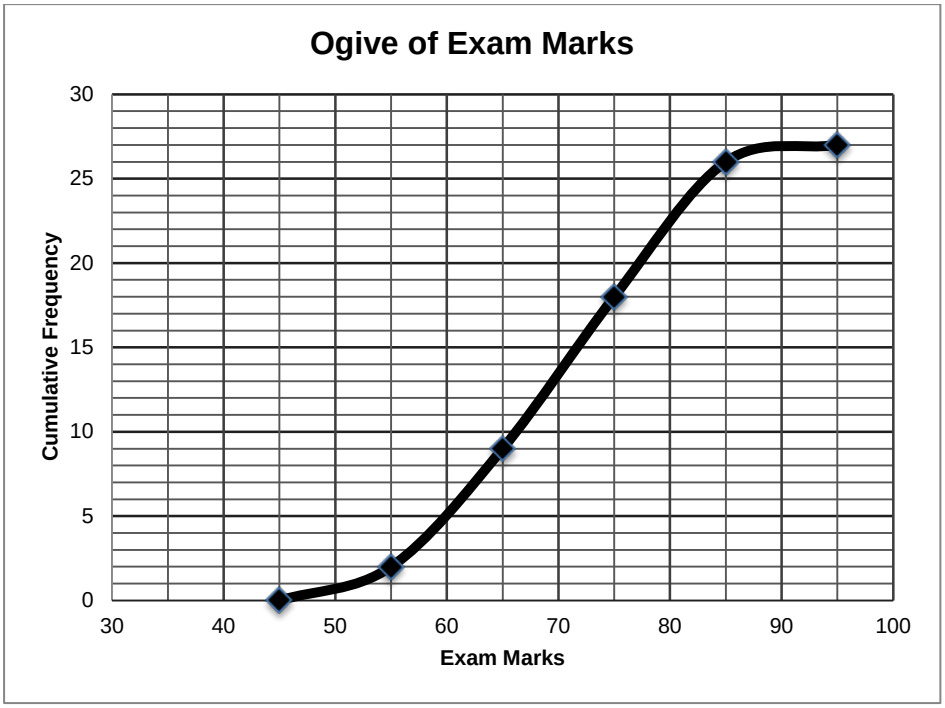
b) The grade 11 Mathematics examination yielded the following results:

Standard deviation	8 %
Mean	65%
Median	61%

Mrs Bloch decides to adjust the results by adding 5% to each person's mark. For the *new* set of marks, write down the:
i) standard deviation. (1)
ii) mean. (1)
iii) median. (1)
[9]

QUESTION 6

Consider the ogive for a set of examination marks and answer the questions that follow.



a) In which interval does the highest frequency of marks occur? (1)
b) Write down the 5 number summary for this set of data. (4)
c) Hence, draw a box-and-whisker plot for these data. (3)
[8]

SECTION B

QUESTION 7

Consider the *quadratic* pattern:

-9 ; -6 ; 1 ; x ; 27

a) Give the value of the second difference. (1)
b) Determine an expression for the second difference in terms of x. (1)
c) Hence, solve for x. (1)
d) Show that $T_n = 2n^2 - 3n - 8$. (5)
e) Which term in the sequence has a value of 397? (4)
[12]

QUESTION 8

a) (i) Which, if any, of these numbers is non-real?

$-\sqrt{7}$ or $\sqrt{-7}$ (1)

(ii) For which value(s) of x is $\sqrt{(3x-1)(x+2)}$ defined? (3)

b) Simplify $\sqrt{\dfrac{2^{n+3}+2^n}{2^{n-2}}}$ (4)

c) Without solving the equation, discuss the nature of the roots of $x^2 - px - 5 = 0$. (4)

[12]

QUESTION 9

David King invests R15 000 for 5 years. He withdraws R5 000 at the end of the first year, a further R8 000 at the end of the 3rd year and has Rx at the end of the 5th year. Interest is calculated at 7% pa compounded monthly for the full 5 year period of the loan. What is the investment worth at the end of the 5 year period? (ie find x) (6)

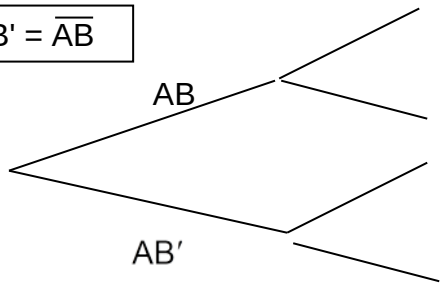
[6]

QUESTION 10

a) Because of their family history, every child born to a certain couple has a 75% chance of having the rare blood type AB. The couple has 2 children.

(i) Copy and complete this tree diagram into your answer book to illustrate all possible probabilities. (4)

NB AB' = $\overline{AB}$



(ii) What is the probability that at least one of their 2 children will have the blood type AB? (2)

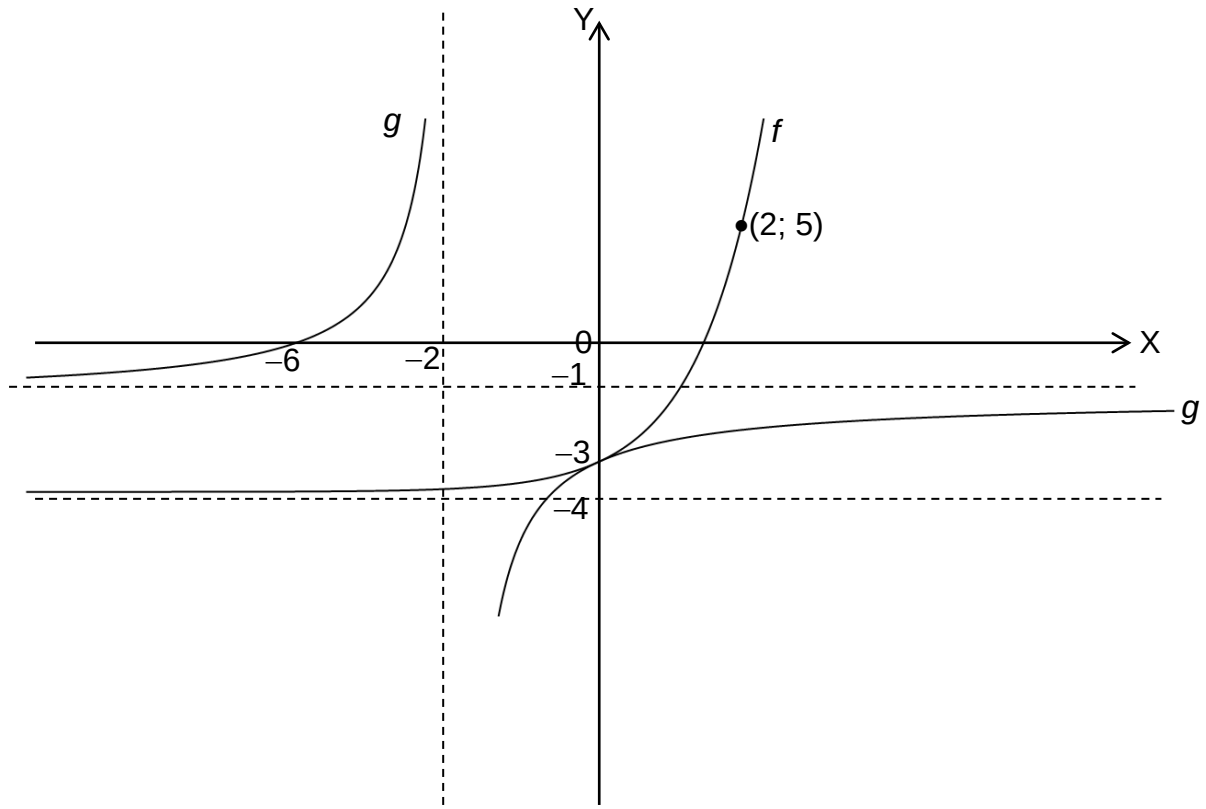
b) Given: P(M) = x ; P(N) = $x - 0,2$ and P(MUN) = $0,65$.

If M and N are **independent** events, find the value of x. (5)

[11]

QUESTION 11

The graphs of $f(x) = b^x + c$ and $g(x) = \frac{a}{x+p} + q$ are shown below: Use the graphs to answer the questions which follow. f and g intersect on the Y – axis



a) Write down the equation of the asymptote of f. (1)
b) Determine the equation of f. (3)
c) Write down the equations of the asymptotes of g. (2)
d) Determine the equation of g. (2)
e) For which values of x is $\frac{a}{x+p} + q = b^x + c$? (1)
f) For which values of x is $b^x + c - \frac{a}{x+p} > q$? (2)

[11]

QUESTION 12

a) If $2^m \cdot 3^n = 64 \cdot 6^4$, determine the value of m – n. (4)

b) Determine the sum of all the values of x so that $\left(a^2 - 3a + 3\right)^{x^2-3x} = 1$ (4)

[8]