HILLCREST HIGH SCHOOL

MATHEMATICS: GRADE 10

MAY 2014

TIME: 2 HOURS TOTAL: 100

INSTRUCTIONS: THIS PAPER CONSISTS OF 11 QUESTIONS.
CHECK THAT THERE ARE NO PAGES MISSING.

1. Show all working details and number the questions exactly as they are numbered on the question paper.

2. Calculators may be used unless stated otherwise. Round off to two decimal digits unless stated otherwise.

3. It is in your interest to write clearly and neatly.

Question 1

Simplify:

1.1 $(2x-5)(3x+7)$ (2)

1.2 $(4x-3)(16x^2+12x+9)$ (2)

[4]

Question 2

Factorise and simplify the following expressions fully:

2.1 $3x^2+9x-2xy-6y$ (3)

2.2 $\dfrac{m^2-49}{m^2+7m} \div \dfrac{m^2-4m-21}{m^2}$ (5)

2.3 $6y^2-13y+5$ (3)

[11]

Question 3

Simplify the following expression fully:

$$\frac{3^{2n-1}\cdot 27^{n+1}}{9^{2n}}$$

[4]

Question 4

Solve for x:

4.1 $(4x+5)^2=0$ (3)

4.2 $\dfrac{1}{2}+\dfrac{1}{3x}=\dfrac{2-3x}{6x}$ (4)

4.3 $7\cdot 3^{x-2}=567$ (3)

4.4 $D=\dfrac{m\sqrt{x}}{2\pi}$ (2)

[12]

Question 5

5.1 Solve the following inequality:

$5 \le 2x-1 < 9$

Illustrate your answer on a number line if x is a real number. (3)

5.2 Solve for x and y simultaneously:

$6x+y=22$

$4x-y=8$ (4)

[7]

Question 6

6.1 A bag contains 5 red (R), 3 green (G) and 2 blue (B) sweets.
Determine:

6.1.1. $n(R)$ (1)

6.1.2 $n(S)$ (1)

6.1.3 $P(G)$ (2)

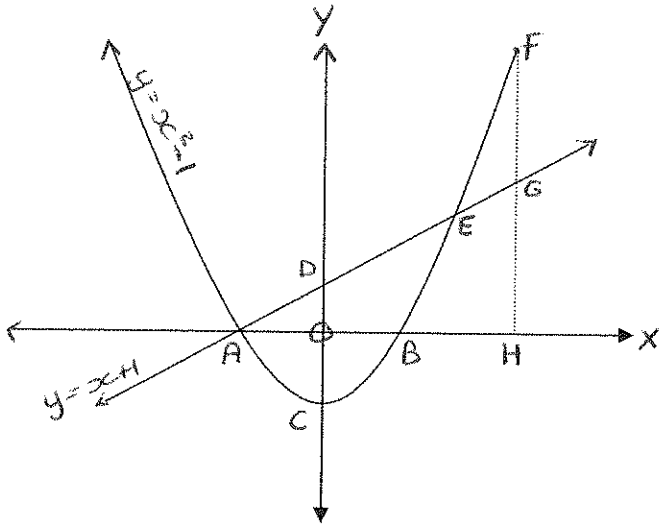
6.2 A sample space S is given by: {1,2,3,4,5,6,7,8,9,10}. Two events in this sample space are A = {2,4,6,8,10} and B = {1,2,3,4,5}. Draw a Venn Diagram to show this and find the probability that a number chosen a random is in:

6.2.2 A and B (3)

6.2.3 A or B (2)

[9]

Question 7



Sketched above are the graphs $y = x^2 - 1$ and $y = x + 1$
Determine:

7.1 the co-ordinates for A and B (the x-intercepts) (3)

7.2 the co-ordinates for C, the turning point (2)

7.3 the co-ordinates of the y-intercept at D (2)

7.4 the co-ordinates of E, the point of intersection (5)

7.5 the distance of FG if OH is 4 units (4)

[16]

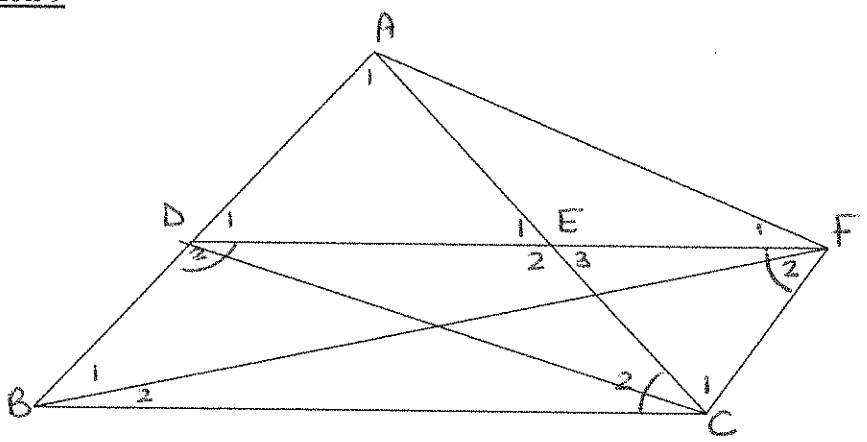
Question 8

Draw neat sketch graphs of

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

on the same set of axes provided on the diagram sheet and clearly indicate the intercepts with the axes. **[6]**

Question 9



Study the diagram above and then complete the following statements with a reason (in your answer books).

Example: If AD = DB and DE//DC then AE = EC (Converse Midpoint Theorem)

9.1 If $\hat{A}_1 = \hat{C}_1$ then _____ (2)

9.2 If AD = DB and AE = EC then _____ (2)

9.3 If AE = EC and DE = EF then _____ (2)

9.4 If AD = AE then _____ (2)

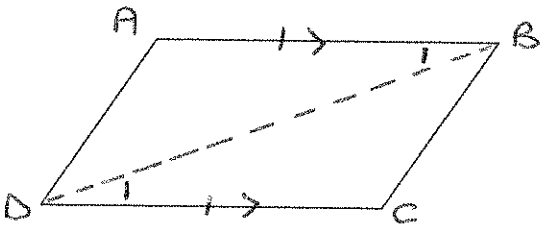
9.5 If DB = FC and DB // FC then _____ (2)

9.6 If $\hat{D}_1 = \hat{B}_1 + \hat{B}_2$ then _____ (2)

[12]

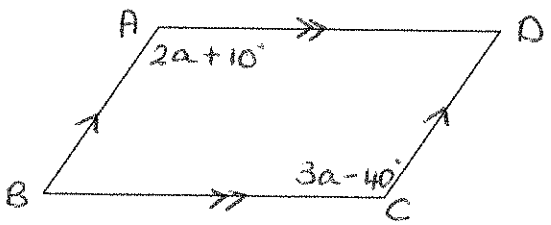
Question 10

Use the diagram below to prove the theorem that states that in a quadrilateral, if one pair of opposite sides are equal and parallel, then it is a parallelogram. **[6]**



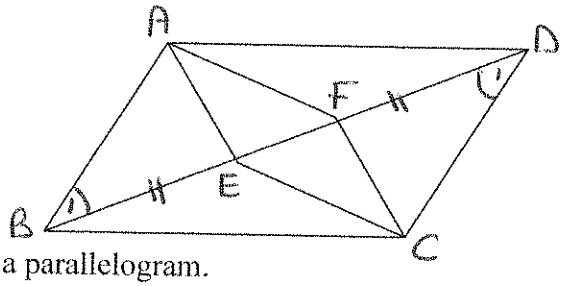
Question 11

11.1



Calculate a. (3)

11.2



ABCD is a parallelogram.
BE = DF
Prove that:

11.2.1 $\Delta AEB \equiv \Delta CFD$ (4)
11.2.2 AE // CF (3)
11.2.3 AECF is a parallelogram (3)
[13]