Firrhill High School

Mathematics Department

Level 5

Assessment Questions

Algebra

Solving Equations & Inequations

(1) 2008 paper 1 Q.6

Jane enters a two-part race.

(*a*) She cycles for 2 hours at a speed of $(x + 8)$ kilometres per hour.
Write down an expression in x for the distance cycled. **1**

(*b*) She then runs for 30 minutes at a speed of x kilometres per hour.
Write down an expression in x for the distance run. **1**

(*c*) The **total** distance of the race is 46 kilometres.
Calculate Jane's **running** speed.

(2) 2008 Paper 2 Q.10

KU	RE

To hire a car costs £25 per day plus a mileage charge.
The first 200 miles are free with each additional mile charged at 12 pence.

(*a*) Calculate the cost of hiring a car for 4 days when the mileage is 640 miles. **1**

(*b*) A car is hired for d days and the mileage is m miles where $m > 200$.
Write down a formula for the cost £C of hiring the car. **3**

(3) 2007 Paper 2 Q.4

Solve the inequality

$$\frac{x}{4} - \frac{1}{2} < 5.$$

2

(4) 2006 Paper 1 Q.6

Solve the equation

$$x - 2(x+1) = 8.$$

3

(5) 2005 Paper 1 Q.6

Solve the equation

$$\frac{2}{x} + 1 = 6.$$

3

(6) 2004 Paper 1 Q.3

$A = 2x^2 - y^2$.

Calculate the value of A when $x = 3$ and $y = -4$.

2

(7) 2003 Paper 2 Q.5

The number of diagonals, d, in a polygon with n sides is given by the formula

$$d = \frac{n(n-3)}{2}.$$

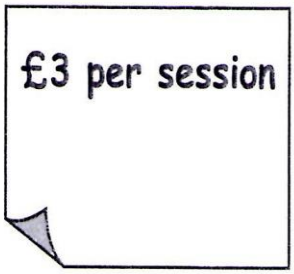
A polygon has 20 diagonals.

How many sides does it have?

4

(8) 2006 Paper 1 Q.11

	KU	RE
(*a*) One session at the Leisure Centre costs £3.		



Write down an algebraic expression for the cost of x sessions.		1
(*b*) The Leisure Centre also offers a monthly card costing £20. The **first 6** sessions are then free, with each additional session costing £2.		

(i) Find the **total** cost of a monthly card and 15 sessions.	1	
(ii) Write down an algebraic expression for the **total** cost of a monthly card and x **sessions**, where x is greater than 6.		2
(*c*) Find the minimum number of sessions required for the monthly card to be the cheaper option. **Show all working.**		3

(9) 2003 Paper 2 Q.11

	KU	RE
(*a*) A driver travels from A to B, a distance of x miles, at a constant speed of 75 kilometres per hour. Find the time taken for this journey in terms of x.	1	
(*b*) The time for the journey from B to A is $\frac{x}{50}$ hours. Hence calculate the driver's average speed for the whole journey.		4

(10) 2002 Paper 1 Q.3

Solve the inequality $5 - x > 2(x + 1)$.	3	

(11) 2002 Paper 2 Q.9

Esther has a new mobile phone and considers the following daily rates.

Easy Call	**Green Call**
25 pence per minute for the first 3 minutes 5 pence per minute **after** the first three minutes	40 pence per minute for the first 2 minutes 2 pence per minute **after** the first two minutes

(*a*) For Easy Call, find the cost of ten minutes in a day.	1	
(*b*) For Easy Call, find a formula for the cost of "m" minutes in a day, $m > 3$.		1
(*c*) For Green Call, find a formula for the cost of "m" minutes in a day, $m > 2$.		1
(*d*) Green Call claims that its system is cheaper. Find **algebraically** the least number of minutes (to the nearest minute) which must be used each day for this claim to be true.		3

(12) 2001 Paper 1 Q.4

Solve **algebraically** the equation

$$2x - \frac{(3x-1)}{4} = 4.$$

3

(13) 2001 Paper 1 Q.11

The intensity of light, I, emerging after passing through a liquid with concentration, c, is given by the equation

$$I = \frac{20}{2^c} \quad c \geq 0.$$

(*a*) Find the intensity of light when the concentration is 3. 1

(*b*) Find the concentration of the liquid when the intensity is 10. 2

(*c*) What is the maximum possible intensity? 3

(14) 2000 Paper 1 Q.8

Solve **algebraically** the inequality

$$2y < 3 - (y + 6).$$

3

(15) 1999 Paper 1 Q.2

Evaluate

$20 - 4x^2y$ where $x = -1$ and $y = 3$. 2

(16) 1999 Paper 1 Q.9

Solve **algebraically** the inequality

$$5x - 4 < 2(1 - 2x).$$

3

(17) 1998 Paper 1 Q.2

Evaluate $a^2 + 2ab$ where $a = -5$ and $b = -4$. 2

18) 2015 N5 Paper 1

2. Solve algebraically the inequality

$$11-2(1+3x)<39$$

3

19) 2013 Credit Paper 1

7. (*a*) Expand and simplify

$$(2x-5)(x^2+3x-7).$$

3

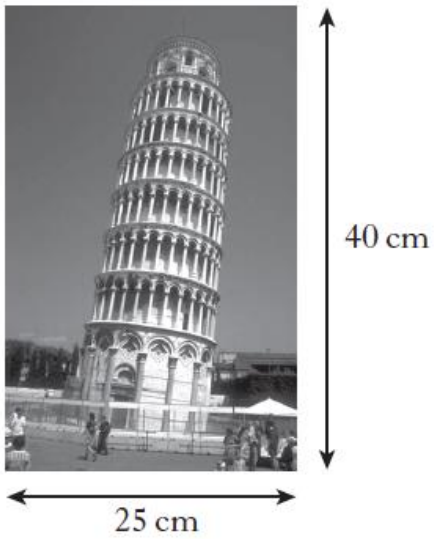
(*b*) Solve the inequality

$$4x-5\leq 7x-20.$$

3

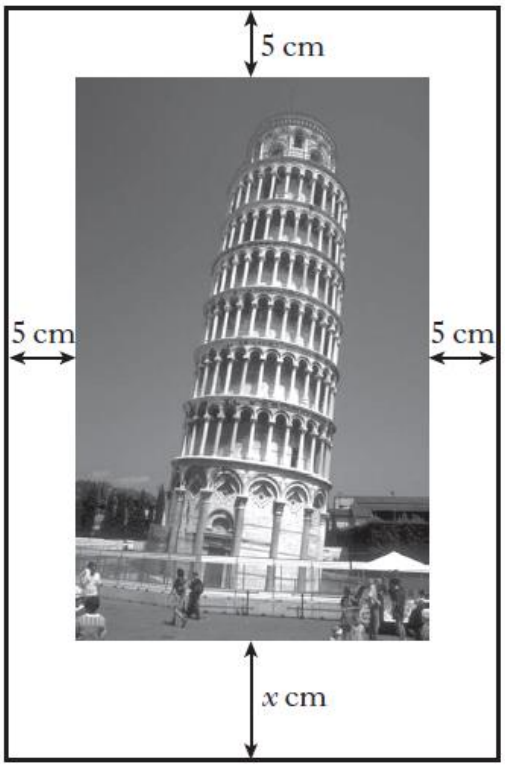
20) 2013 Credit Paper 2

13. Asim has a poster which is 25 centimetres wide and 40 centimetres high.



He decides to place it on a white card.

The card and the poster are mathematically similar.



The border is 5 centimetres wide on three sides and x centimetres wide on the fourth side as shown.

Calculate the value of x. | | 4

21) 2012 Credit Paper 1

	KU	RE
9. Each day, Marissa drives 40 kilometres to work.		
(*a*) On Monday, she drives at a speed of x kilometres per hour. Find the time taken, in terms of x, for her journey.	1	
(*b*) On Tuesday, she drives 5 kilometres per hour **faster**. Find the time taken, in terms of x, for this journey.		1
(*c*) Hence find an expression, in terms of x, for the difference in times of the two journeys. Give this expression **in its simplest form**.		3

22) 2011 Credit Paper 1

4. Solve the equation

$$3x+1=\frac{x-5}{2}.$$ | | 3