

ELGIN ACADEMY

Prelim Examination 2006 / 2007

MATHEMATICS Standard Grade - Credit Level

Paper II

Time allowed - 80 minutes

Read Carefully

1. Answer as many questions as you can.
2. Full credit will be given only where the solution contains appropriate working.
3. **You may use a calculator**

FORMULAE LIST

The roots of $ax^2 + bx + c = 0$ are $x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$

Sine rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

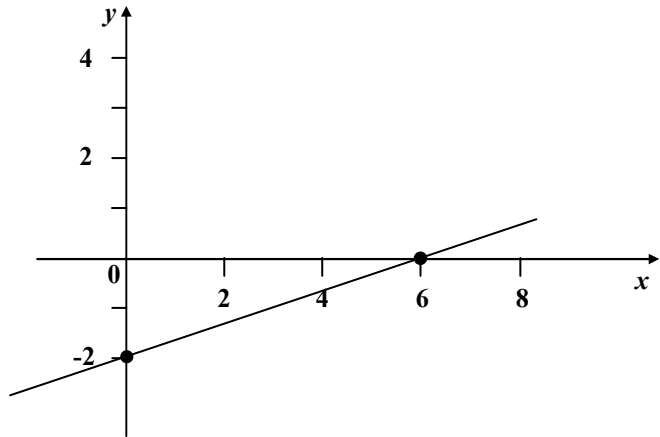
Cosine rule: $a^2 = b^2 + c^2 - 2bc \cos A$ or $\cos A = \frac{b^2 + c^2 - a^2}{2bc}$

Area of a triangle: $\text{Area} = \frac{1}{2}ab \sin C$

Standard Deviation: $s = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}} = \sqrt{\frac{\sum x^2 - \frac{(\sum x)^2}{n}}{n - 1}}$

KU	RE
3	
1	
1	4
4	
	2

4. Find the equation of the line in the diagram.



5. Some friends stopped at a roadside café.

- (a) Peter bought 3 bacon rolls and 2 cups of tea which cost him a total of £5.10. Taking the cost of a bacon roll as 'x' pence and 'y' as the cost of a cup of tea, write an equation to illustrate this.

At the same café, Colin bought 2 bacon rolls and 1 cup of tea and was charged £3.15.

- (b) Construct a second equation to illustrate this.
(c) How much did Stewart pay for 4 bacon rolls and 3 cups of tea?

6. Fiona Baxter discovered that to make the best mango chutney the mango should weigh as close to 230 grams as possible. Less than 230g the mango becomes sour and more than 230g the mango becomes too sweet.

Fruit-to-go have sent a sample of 8 mangoes, their weights are shown in the table below.

Mango	1	2	3	4	5	6	7	8
Average weight (g)	231	228	230	235	231	227	230	228

- (a) Calculate the mean and standard deviation of this batch of mangoes, giving your answers correct to 1 decimal place where necessary.
(b) Burtlets Fruit also sent a sample of 8 mangoes. The mean weight of this batch is 230g and the standard deviation is 0.8.

Which company should Fiona choose to supply her with mangoes.

You must give a reason for your answer!

KU	RE
	2
	3
	5

10. The cost of having a booklet printed by ‘TRUEPRINT’ depends on the number of pages and the number of booklets to be printed.

The details are shown in the table below.

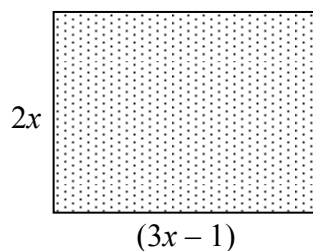
NUMBER of PAGES	COSTS
Less than or equal to 2	£0.15 for each of the first 300 booklets printed
Greater than 2 pages but less than or equal to 6 pages.	£0.21 for each of the first 300 booklets printed
Greater than 6 pages	£0.29 for each of the first 300 booklets printed

Where the number of booklets to be printed at any one time is **greater than 300** a charge of £0.12 is made for **each additional** booklet (for any number of pages).

- (a) Calculate the cost of printing 450 booklets with 4 pages in each.
- (b) **Show clearly** that the formula for the cost, £ C , of having b booklets printed, where b is greater than 300 and each booklet consists of 4 pages, can be written as

$$C = 27 + 0.12b$$

11.



The area of the rectangle in the diagram is 31m^2

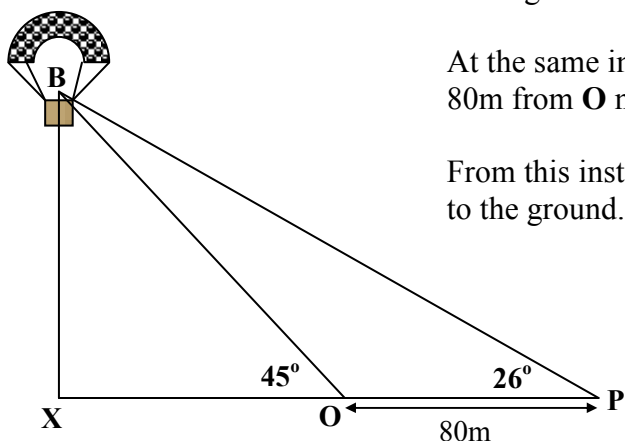
Calculate the value of x giving your answer **correct to 1 decimal place**.

12. A basket, **B**, containing medical supplies is descending vertically at a constant speed over a point **X**.

An observer, **O**, notes that at a certain instant the angle of elevation to **B** is 45° .

At the same instant a second observer, **P**, standing 80m from **O** notes the angle of elevation to **B** is 26° .

From this instant the basket takes 6 minutes to fall to the ground.



Calculate the speed at which the basket falls to the ground in m/min.

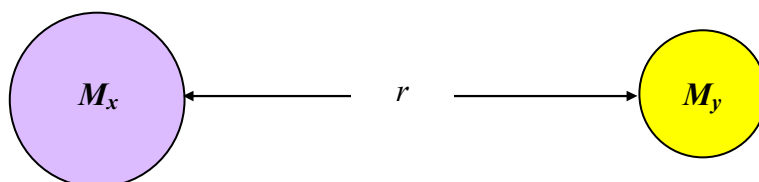
13. Newton's Law of Gravity states that:

Each object in the Universe attracts each other object.

If object *X* has mass M_x and object *Y* has mass M_y then the force, F , on object *X* is directed towards object *Y* and has magnitude F , given by the formula

$$F = \frac{GM_x M_y}{r^2}, \text{ where } G - \text{Gravitational constant}$$

r – Distance between the two bodies.



If the distance between the two bodies is doubled, what would happen to the force, F , between them?

6

3

[END OF QUESTION PAPER]