

BRADFIELD COLLEGE
SCHOLARSHIP EXAMINATION 1997
MATHEMATICS 2

Time: 1 hour 30 minutes

ANSWER ALL QUESTIONS. CALCULATORS MAY BE USED.

ALL WORKING MUST BE SHOWN.

ANSWERS UNSUPPORTED BY WORKING MAY NOT OBTAIN FULL MARKS.

(Give answers to 3 significant figures where appropriate.)

1. a) Calculate, giving all the figures on your calculator

$$\frac{2.99}{0.99} + 1.02 \times 6.98$$

$$0.99 + \sqrt{8.96}$$

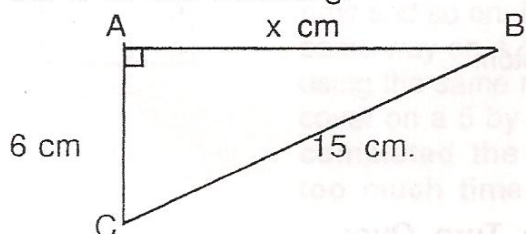
b) James was told that he obtained a mark of 72 in his Maths examination. Marks were increased by 25% as they were not originally marked out of 100.

(i) What was the resulting mark for James?

(ii) What was the examination originally marked out of?

c) Find the smallest positive whole number x , such that $x(2x + 2) > 124$

d) Find x in the following:



e) The largest possible circle was cut from a square piece of card measuring 12 cm by 12 cm. Find the area of card wasted. Express this as a percentage of the area of the square. If the length of the square was different would this percentage change? Explain your answer.

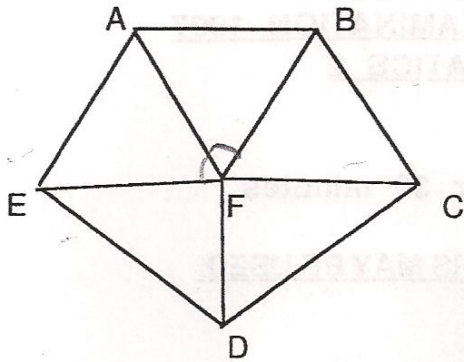
f) Simplify the following :

(i) $2p^3 \times 3pq$ where x means multiply.

(ii) $6p^4q^5 \div (2p^2q^2)$

Please Turn Over

2.



ABCDE is a regular pentagon (all sides are equal and all angles are equal).

a) Show that $\angle EAB = 108^\circ$.

F is the point such that ABF is an equilateral triangle. NOTE The diagram is **not** drawn to scale.

b) Find, giving reasons, (i) $\angle FBC$ (ii) $\angle BFC$

(iii) $\angle CFD$ (iv) $\angle FCD$ (v) $\angle CDF$

c) Does a regular pentagon tessellate? If so explain and if not explain why not.

3. In a class of 24 pupils, Football Clubs supported are Manchester United, Reading, Liverpool, West Ham and Newcastle. Half as many support Liverpool as do Manchester United and one supports West Ham. The number who support Newcastle is equal to the sum of those who support Manchester United and those who support Reading. More support Liverpool than West Ham.

a) How many support each team?

In another class also of 24 pupils a quarter support Southampton, a sixth support Manchester United, an eighth support Reading and the rest support Liverpool.

b) What are the angles at the centre of the pie chart for each of the regions representing the number of supporters of each team in this second class?

Find the probability that a person chosen at random from this second class

c) supports Liverpool.

d) does not support Manchester United.

e) supports either Reading or Southampton.

f) supports West Ham.

Please Turn Over

4. The old British Imperial units of mass were as follows:

16 ounces (oz) = 1 pound (lb)

14 pounds (lb) = 1 stone (st)

2 stones = 1 quarter (qtr)

4 quarters = 1 hundredweight (cwt)

20 hundredweight = 1 ton.

Also 2.205 pounds = 1 Kg.

and 1 tonne = 1000 Kg.

Give all the answers in this question to 3 sig. figs. unless otherwise specified

a) How many g in 1 lb?

b) How many g in 1 oz?

c) How many tons in 1 tonne?

d) Potatoes cost 87p for a 5Kg bag. How much is this per lb to the nearest penny?

e) My mass (often improperly called weight) is 13 st 7 lb. What should I enter on my passport application which asks for my 'weight' in Kg to the nearest Kg.

f) Five people in a lift have 'weights' 10 st 2 lb, 9 st 11 lb, 8 st 10 lb, 12 st 9 lb, 6 st 13 lb.

(i) Calculate their average 'weight' in stones and pounds.

(ii) another person enters the lift and the average 'weight' of the 6 people is now 10 st. How much does this sixth person 'weigh' in st. and lb?

5. A Knight in chess moves in an L shape, 2 squares in one direction (only N, S, E or W, not diagonally) and one square at right angles to it. On a 3 by 3 square board it is possible to cover 8 of the nine squares as shown below:

1	6	3
4		8
7	2	5

where 1 is the starting position, 2 is the next move, 3 the next and so on. How many squares can you cover in the same way on a 4 by 4 square board? Show how you do it using the same notation. See how many squares you can cover on a 5 by 5 board? (**Make sure you have completed the rest of the paper before you spend too much time on this question!**)

THE END