

# perfectpapers

## [MATH(I2)05NC]

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NATIONAL  
QUALIFICATIONS  
2005

TIME: 1 HOURS 10  
MINUTES

MATHEMATICS  
INTERMEDIATE 2  
Units 1, 2 and 3

Non-calculator Paper

Estimate Examination Paper

### 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 NOT use a calculator.**
- 4 Square-ruled paper is provided.

*This test paper must be withdrawn from candidates after the examination and any follow-up discussion of marks/grades awarded. This is to ensure the 'sight unseen' status of this paper is maintained for your centre and other schools/colleges during the diet of prelim examinations in 2004/2005. Submission of this test paper for Appeals purposes will assume that these conditions have been applied.*

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## 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:  $\text{Area} = \frac{1}{2}ab \sin C$

Volume of a sphere:  $\text{Volume} = \frac{4}{3}\pi r^3$

Volume of a cone:  $\text{Volume} = \frac{1}{3}\pi r^2 h$

Volume of a cylinder:  $\text{Volume} = \pi r^2 h$

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

ALL questions should be attempted.

Marks

1. Simplify  $\sqrt{80} + \sqrt{20}$  3

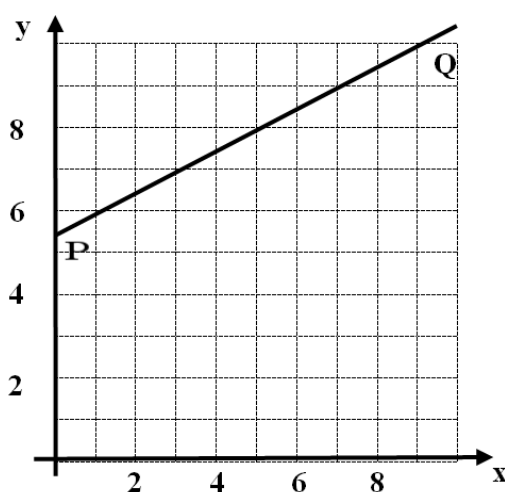
2. (a) Multiply out the brackets and collect like terms.

$$(3x - 2y)(4x - 5y) \quad \text{2}$$

(b) Factorise fully the following expression.

$$4x^2 - 12x - 40 \quad \text{2}$$

3.



Find the equation of the straight line PQ. 3

4. Landside District Council wishes to buy canoes for the new outdoor leisure complex that is under construction. It can purchase single or tandem canoes. It has the staff to deal with a total of 24 canoes.

(a) Let  $x$  be the number of single canoes and let  $y$  be the number of tandem canoes. Write down an equation in  $x$  and  $y$  which satisfies the above condition. 1

(b) Landside has a total budget of £2400 to spend on the canoes. If a single canoe costs £80 and a tandem canoe costs £140. Write down an equation in  $x$  and  $y$  which satisfies this condition. 1

(c) How many canoes of each type should the Landside buy to use up their budget completely? 3

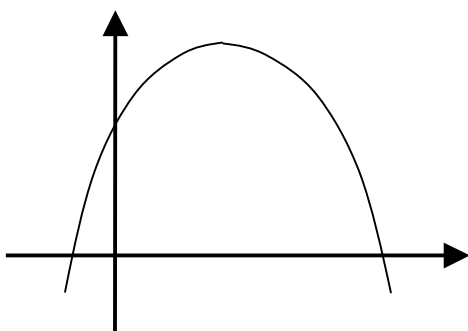
[Turn over

5. Windslow Golf club ran a junior tournament and recorded the individual scores

78	84	85	76	80	81	82	84	79
82	86	78	79	84	92	82	80	83

- (a) From the above data, find the median, the lower quartile and the upper quartile. 2
- (b) Construct a boxplot for the above data. 2

6.



A parabola is given by the formula.

$$f(x) = 3 + 2x - x^2$$

- (a) Find the roots of the equation  $3 + 2x - x^2 = 0$  2
- (b) Hence or otherwise find the coordinates of the turning point for the above parabola. 3

7. In a dark cinema Derek opens a bag of Opal Burst sweets. The bag contains 6 strawberry, 8 orange, 4 lime and 12 cherry sweets.

- (a) Derek chooses a sweet at random. What is the sweet that he is most likely to choose and what is the probability of this happening? 2
- (b) After half an hour Derek has eaten 2 strawberry, 3 orange, 4 lime and 5 cherry sweets. What is the probability that the next sweet that Derek chooses is a strawberry? 2

[END OF QUESTION PAPER]

# perfectpapers

## [MATH(I2)05C]

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NATIONAL  
QUALIFICATIONS  
2005

TIME: 1 HOURS 30  
MINUTES

MATHEMATICS  
INTERMEDIATE 2  
Units 1, 2 and 3

Estimate Examination Paper

### Read Carefully

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1. Katy records the number of e-mails she receives at work Monday to Saturday.

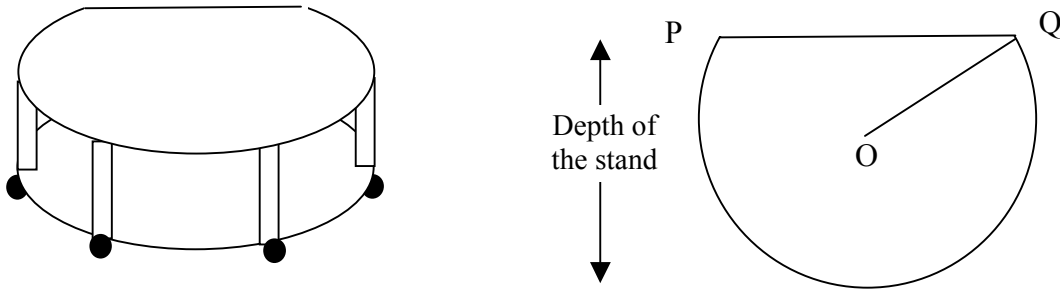
32                  27                  25                  28                  24                  14

Use an appropriate formula to calculate the standard deviation.

Show clearly all your working.

4

2. A television stand has a top in the shape of part of a circle as shown below.



The centre of the table is given by O.  
PQ is a chord of the circle and is 60cm.  
The radius, OQ, is 48cm.

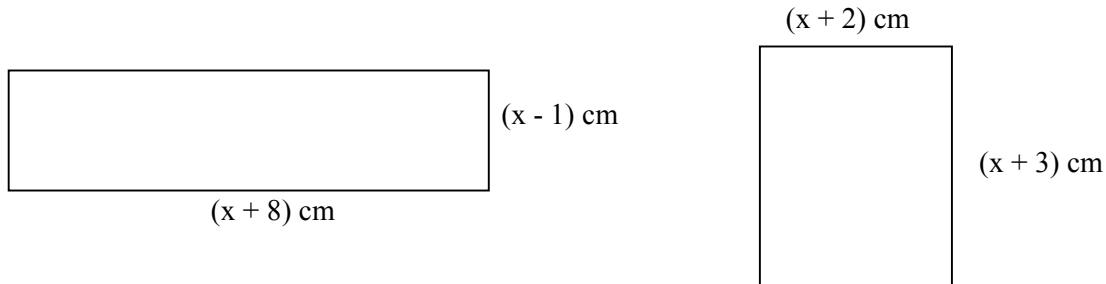
Find the distance that the stand sticks out into the room (i.e. the depth of the stand).

4

3. Alex buys a new car for £15000. He is told that it will depreciate by 20% in it's first year and then by 15% every year after that. How much will his car be worth in 4 years time? (to the nearest £100)

4

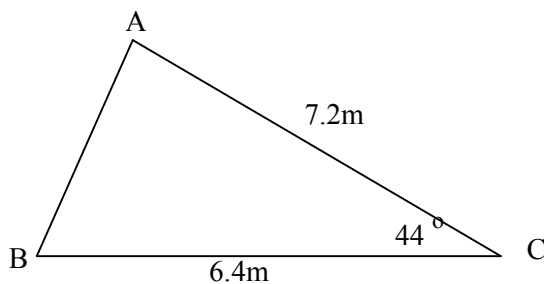
4. The following rectangles have the same area. Find the value of x.



4

[Turn over

5. The following diagrams show a triangle ABC.



- (a) Calculate the length of AB (to 2 significant figures).  
**Do not use a scale drawing.**
- (b) Calculate the area of triangle ABC.
6. The “Holiday Company” decided to research the most popular destination of its customers. They recorded the results below.

Destination	Frequency
UK	80
Europe	320
USA/Canada	160
Far East	100
Cruise	140

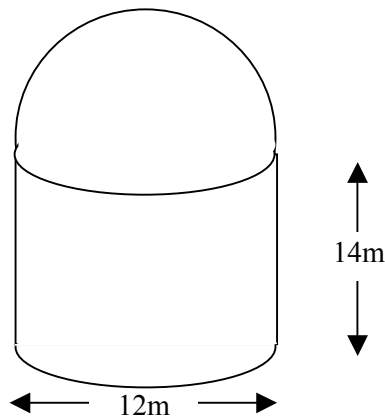
Construct a pie chart to illustrate this information (**showing all your working**).

7. Solve the equation.

$$3x^2 - 4x - 2 = 0$$

Giving your answer correct to 1 decimal place.

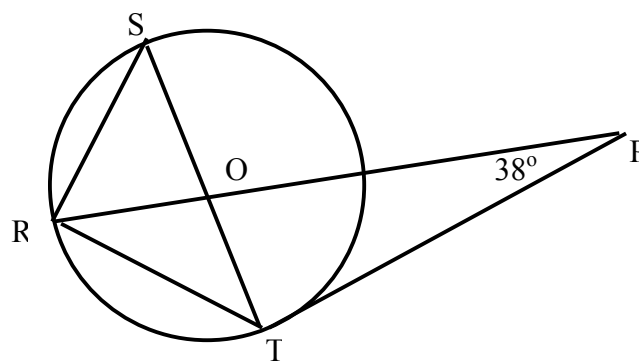
8. Grain is stored in a silo in the shape of a cylinder with a hemi-sphere on top.



- (a) What is the total volume that the silo can store? (correct to 3 significant figures) 5
- (b) If the farmer stores  $600\text{m}^3$  of grain, how far up the silo will it reach? 3
9. A ship spots a lighthouse on a bearing of  $120^\circ$ . The ship travels due south for 14km and notices that the lighthouse is now on a bearing of  $050^\circ$ .

- (a) Sketch a diagram showing the above information. 1
- (b) Calculate how far the lighthouse is away from the ship when the second bearing is taken. 4  
**Do not use a scale drawing.**

10. In the diagram below PT is a tangent to the circle, O is the center of the circle and angle RPT is  $38^\circ$ . Find the size of angle ORS.



3

11. (a) Sketch a graph of  $4\cos 2x^\circ$  for  $0 \leq x \leq 360$  3

(b) Solve the equation  $3\sin x^\circ + 4 = 5$   
for  $0 \leq x \leq 360$  3

[END OF QUESTION PAPER]