# WELSH JOINT EDUCATION COMMITTEE

**General Certificate of Secondary Education** 



CYD-BWYLLGOR ADDYSG CYMRU

Tystysgrif Gyffredinol Addysg Uwchradd

## 185/04

### MATHEMATICS

### PILOT EXAMINATION

#### **HIGHER TIER PAPER 1**

P.M. MONDAY, 4 June 2007

(2 Hours)

## CALCULATORS ARE NOT TO BE USED FOR THIS PAPER

# INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer all the questions in the spaces provided.

Take  $\pi$  as 3.14.

## INFORMATION FOR CANDIDATES

You should give details of your method of solution when appropriate.

Unless stated, diagrams are not drawn to scale.

Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

No certificate will be awarded to a candidate detected in any unfair practice during the examination.

For Examiner's use only						
Question	Maximum Mark	Mark Awarded				
1	2					
2	3					
3	4					
4	3					
5	3					
6	3					
7	7					
8	3					
9	3					
10	4					
11	6	5				
12	5					
13	4					
14	3					
15	4					
16	2					
17	8					
18	6					
19	5					
20	3					
21	5					
22	4					
23	5					
24	5					
TOTA	TOTAL MARK					

#### **Formula List**

cross-section

ieng

С



**Volume of sphere** =  $\frac{4}{3} \pi r^3$ **Surface area of sphere =**  $4\pi r^2$ 

Volume of cone =  $\frac{1}{3} \pi r^2 h$ **Curved surface area of cone** =  $\pi rl$ 

In any triangle ABC

**Sine rule**  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$ **Cosine rule**  $a^2 = b^2 + c^2 - 2bc \cos A$ 

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

# The Quadratic Equation

The solutions of  $ax^2 + bx + c = 0$ where  $a \neq 0$  are given by

## **Standard Deviation**

Standard deviation for a set of numbers

 $x_1, x_2, \ldots, x_n$ , having a mean of  $\overline{x}$  is given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

С

$$s = \sqrt{\frac{\sum (x-\overline{x})^2}{n}}$$
 or  $s = \sqrt{\frac{\sum x^2}{n} - \left\{\frac{\sum x}{n}\right\}^2}$ 





(185-04)

- Examine only Arholwr yn unig
- 1. A 200 ml tin of pink paint is made by mixing 150 ml of white paint and 50 ml of red paint. Find how much white paint is needed to make a 300 ml tin of the pink paint.

..... White paint ..... ml [2] Simplify 5(x - 3y) + 6x - 10y. 2. ..... ..... [3]

26 16

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Turn over.



学家などの情報で新聞

4. The diagram shows a triangle ABC with BC = 8 cm,  $AXB = 90^{\circ} \text{ and } AX = 3 \text{ cm}$ 



Diagram not drawn to scale.

.....

Find the area of the triangle ABC. State appropriate units for your answer.

[3]

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.....

5.



A ship, S, is on a bearing of  $220^{\circ}$  from Criccieth and on a bearing of  $305^{\circ}$  from Aberystwyth. By drawing suitable lines on the above diagram, mark the position of S.

÷ .

[3]

Turn over.

 Jane scored 140 out of 200 in a Mathematics test. In an English test she scored 48 out of 60. Work out the percentage score that Jane had

in the Mathematics test, (a)..... ..... [2] in the English test. (b) ..... ..... ..... ..... 2 ..... [1]

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7. The following diagram shows a card in the shape of a trapezium, with a circular hole of radius 10 cm cut out of the card.

The lengths of the parallel sides of the trapezium are 55 cm and 45 cm and the perpendicular distance between the parallel sides is 30 cm.



Diagram not drawn to scale.

# Using the value of $\pi$ as 3.14, calculate

 (a) the circumference of the circular hole,

 [2]

 (b) the area of the shaded part of the card.

 [2]

 (b)

 (c)

 [2]

 (c)

 (c)

- Exami only Arhoi yn ur
- 8. In a particular street of 50 houses, a survey of the number of pets in each house was carried out. The following frequency distribution was obtained.

Number of pets per house	Number of houses		
0	15		
1	13		
2	10		
3	8		
4	2		
5	2		

8

Calculate the mean number of pets per house.

[3]

Examiner only Arholwr yn unig Showing all your working ESTIMATE the value of: 9.  $\frac{202 \times 60.3}{0.191}$ ..... ..... . . . . . . . . [3] 

10. In the following diagram, shade the region which satisfies all of the following conditions. The distance from AD is greater than the distance from DC. The distance from D is less than the distance from C.
The distance from A is less than 7 cm.

B A C D

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11

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[4]

x	-2	-1	0	1	2	3	4
$v = 5 - x^2$	1		5	4	1	-4	-11

11. (a) Complete the following table which gives values of  $y = 5 - x^2$  for values of x from -2 to 4. [1]

(b)	Using suitable so	cales draw the	graph	of $y = 5 - x$	$^{2}$ for values	of <i>x</i> from	-2 to 4 on	the graph
	paper below.							[3]



(c) Draw the line y = 2 on the graph paper and write down the x-values of the points where the two graphs intersect.

[2]



Turn over.

[2]





(c) The diagram below shows a teacher's sketch of a transformation.



What is the name of this type of transformation?

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[1]

Examiner only Arholwr yn unig **13.** Solve the equation 5(x + 4) - 3(x - 2) = 0. ..... ..... .... [4] Turn over. (185-04)

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14. The time taken by each of 50 students to sew a button on a shirt was recorded. A summary of the results is shown in the cumulative frequency diagram.



(a) Estimate the median of the times taken by these students to sew a button on to a shirt.

(b) Estimate the interquartile range for the times to sew a button on a shirt. [2]

Exam

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15. Solve the following simultaneous equations by an algebraic (not graphical) method. Show all your working.

$$6x + 5y = 23$$
  
 $4x + 3y = 18$ 

..... ..... [4] 16. Triangles ABC and PQR are similar, with  $\overrightarrow{BAC} = \overrightarrow{QPR}$ ,  $\overrightarrow{BCA} = \overrightarrow{QRP}$ , AB = 6 cm, BC = 7 cm, AC = 5 cm and PQ = 9 cm. Q B 9 cm 6cm 7 cm Α 5 cm CR Diagrams not drawn to scale. Showing all your working, find the length of QR. [2]

17. (a) Simplify (i) 85<sup>0</sup>, (ii)  $\left(\sqrt{7}\right)^2$ . ..... [2] Express  $\frac{5}{11}$  as a recurring decimal. (b) [1] Evaluate  $3^{-3}$ . Express your answer as a fraction. (c) ..... [1] (d) Evaluate  $3\frac{2}{5} \times 1\frac{2}{3}$ . ..... [2] Find the lowest common multiple (LCM) and the highest common factor (HCF) of 12 and (e) 18. [2] HCF LCM

18

Examiner

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Make x the subject of the formula **18.** (a)  $x^2 + 3y = 8y + 13.$ ...... ..... [3] Factorise  $3x^2 + 10x - 8$  and hence solve the equation  $3x^2 + 10x - 8 = 0$ . (b) ..... ..... ..... \_\_\_\_\_ ..... [3]

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Examiner only Arholwr yn unig .....

.....

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[3]

[2]

(a) find an expression for y in terms of x,

19. Given that y is inversely proportional to x, and that y = 4 when x = 6,

(b) complete the following table for values of x and y.

.....

.....

x	$\frac{1}{2}$	6	
у		4	3

\_\_\_\_\_

.....

Length of index finger, l mm	Frequency	Frequency density
$0 \leq l < 40$	0	
$40 \leqslant l < 50$	3	a
$50 \leq l < 55$	5	
$55 \leq l < 60$	15	
$60 \leq l < 65$	25	
$65 \leq l < 70$	10	
$70 \leq l < 90$	2	

20. A survey was carried out to find the distribution of the lengths of index fingers. The data was recorded in a grouped frequency table.

Complete the frequency density column in the table above and hence draw the histogram for the data using the axes below. [3]



Frequency density

21

Turn over.

21. A bag contains 20 marbles. There are 13 yellow, 6 green and 1 red marbles in the bag. Two marbles are selected at random from the bag. Calculate the probability that both the selected marbles are green. (a) [2] Calculate the probability that at least one of the selected marbles is yellow. (b) ..... ..... ..... ..... ..... ..... ..... [3]

22. (a) Expand  $(5 + 3\sqrt{2})^2$ . Simplify your answer.

Express 0.243 as a fraction. (b)

Turn over.

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[2]

[2]



(b) The diagram shows a sketch of y = f(x). On the same diagram, sketch the curve y = f(x-2). Mark clearly the coordinates of the points where the curve crosses or touches the x-axis or y-axis. [2]



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(c) The diagram shows a sketch of y = f(x). On the same diagram sketch the curve y = f(x) + 2. Mark clearly the coordinates of the points where the curve crosses or touches the x-axis or y-axis. [2]

