UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

6546202662

MATHEMATICS **0580/23**

Paper 2 (Extended) **October/November 2011**

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Mathematical tables (optional)
Geometrical instruments
Tracing paper (optional)

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 70.

This document consists of **12** printed pages.

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1 Martha divides \$240 between spending and saving in the ratio

spending : saving = 7 : 8 .

Calculate the amount Martha has for spending.

Answer \$ ..... [2]

---

2 210 211 212 213 214 215 216

From the list of numbers, find

(a) a prime number,

Answer(a) ..... [1]

(b) a cube number.

Answer(b) ..... [1]

---

3 Solve the simultaneous equations.

$x + 5y = 22$
$x + 3y = 12$

Answer $x =$ .....

$y =$ ..... [2]

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4 Find the value of $\left(\frac{27}{8}\right)^{-\frac{4}{3}}$.

Give your answer as an exact fraction.

Answer ..... [2]

---

5 The population of a city is 128 000, correct to the nearest thousand.

(a) Write 128 000 in standard form.

Answer(a) ..... [1]

(b) Write down the upper bound of the population.

Answer(b) ..... [1]

---

6 Pedro invested \$800 at a rate of 5% per year **compound** interest.
Calculate the **total** amount he has after 2 years.

Answer \$ ..... [2]

---

7 Show that $3^{-2} + 2^{-2} = \frac{13}{36}$.

Write down all the steps of your working.

Answer

[2]

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8 Find the value of $\dfrac{\sqrt[3]{17.1-1.89}}{10.4+\sqrt{8.36}}$.

Answer ..... [2]

---

9 In Vienna, the mid-day temperatures, in °C, are recorded during a week in December.
This information is shown below.

–2 2 1 –3 –1 –2 0

Calculate

(a) the difference between the highest temperature and the lowest temperature,

Answer(a) ..... °C [1]

(b) the mean temperature.

Answer(b) ..... °C [2]

---

10 Maria decides to increase her homework time of 8 hours per week by 15%.

Calculate her new homework time.
Give your answer in hours and minutes.

Answer ..... h ..... min [3]

---

11 Factorise completely.

$$p^2x - 4q^2x$$

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Answer ..... [3]

---

12 Alberto changes 800 Argentine pesos (ARS) into dollars ($) when the rate is $1 = 3.8235 ARS. He spends $150 and changes the remaining dollars back into pesos when the rate is $1 = 3.8025 ARS.

Calculate the amount Alberto now has in pesos.

Answer ..... ARS [3]

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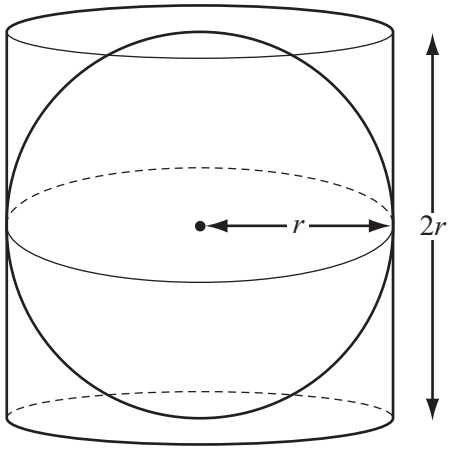
13 During a marathon race an athlete loses 2% of his mass. At the end of the race his mass is 67.13 kg.

Calculate his mass before the race.

Answer ..... kg [3]

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14



NOT TO SCALE

The sphere of radius r fits exactly inside the cylinder of radius r and height $2r$.
Calculate the percentage of the cylinder occupied by the sphere.

[The volume, V, of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

Answer ..... % [3]

---

15 $ap = px + c$

Write p in terms of a, c and x.

Answer $p =$ ..... [3]

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16 The time, t, for a pendulum to swing varies directly as the **square root** of its length, l.
When $l = 9$, $t = 6$.

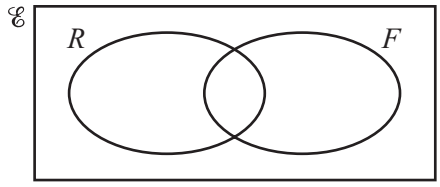
(a) Find a formula for t in terms of l.

Answer(a) $t =$ ..... [2]

(b) Find t when $l = 2.25$.

Answer(b) $t =$ ..... [1]

17



In the Venn diagram, $\mathscr{E}$ = {students in a survey}, R = {students who like rugby} and F = {students who like football}.

$n(\mathscr{E}) = 20$ $n(R \cup F) = 17$ $n(R) = 13$ $n(F) = 11$

(a) Find

(i) $n(R \cap F)$,

Answer(a)(i) ..... [1]

(ii) $n(R' \cap F)$.

Answer(a)(ii) ..... [1]

(b) A student who likes rugby is chosen at random.

Find the probability that this student also likes football.

Answer(b) ..... [1]

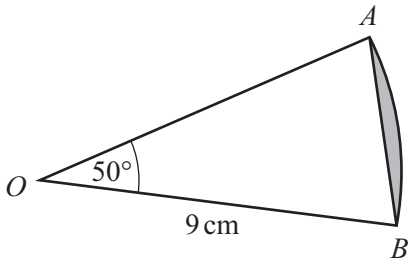
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18 Write as a single fraction, in its simplest form.

$$\frac{1-x}{x} - \frac{2+x}{1-2x}$$

Answer ..... [4]

19



NOT TO SCALE

The diagram shows a sector AOB of a circle, centre O, radius 9 cm with angle $AOB = 50°$.

Calculate the area of the segment shaded in the diagram.

Answer ..... cm^2 [4]

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20 **(a)** $\mathbf{N} = \begin{pmatrix} 2 \\ 6 \end{pmatrix}$. The order of the matrix **N** is 2 × 1.

$\mathbf{P} = (1 \quad 3)$. The order of the matrix **P** is 1 × 2.

(i) Write down the order of the matrix **NP**.

Answer(a)(i) ..... [1]

(ii) Calculate **PN**.

Answer(a)(ii) [1]

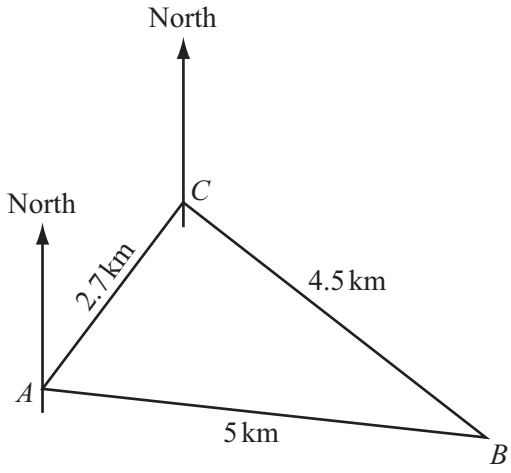
(b) $\mathbf{M} = \begin{pmatrix} 2 & 3 \\ 2 & 4 \end{pmatrix}$.

Find $\mathbf{M}^{-1}$, the inverse of **M** .

Answer(b) $\mathbf{M}^{-1} =$ [2]

21

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NOT TO SCALE

The diagram shows 3 ships A, B and C at sea.

$AB = 5$ km, $BC = 4.5$ km and $AC = 2.7$ km.

(a) Calculate angle ACB.
Show all your working.

Answer(a) Angle ACB = ... [4]

(b) The bearing of A from C is 220°.

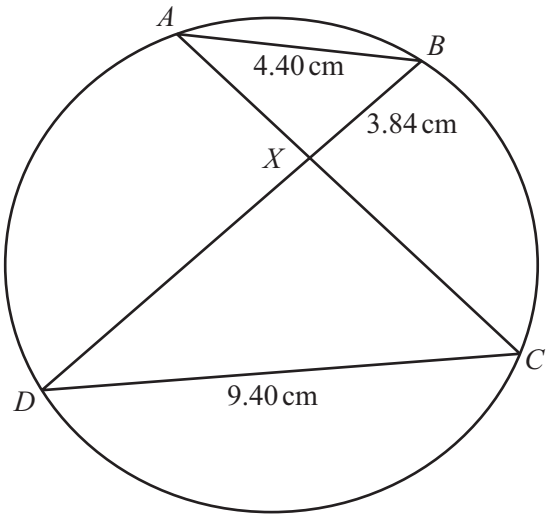
Calculate the bearing of B from C.

Answer(b) ..... [1]

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NOT TO SCALE

A, *B*, *C* and *D* lie on a circle.
AC and *BD* intersect at *X*.

(a) Give a reason why angle *BAX* is equal to angle *CDX*.

Answer(a) ..... [1]

(b) *AB* = 4.40 cm, *CD* = 9.40 cm and *BX* = 3.84 cm.

(i) Calculate the length of *CX*.

Answer(b)(i) *CX* = ... cm [2]

(ii) The area of triangle *ABX* is 5.41 cm^2.

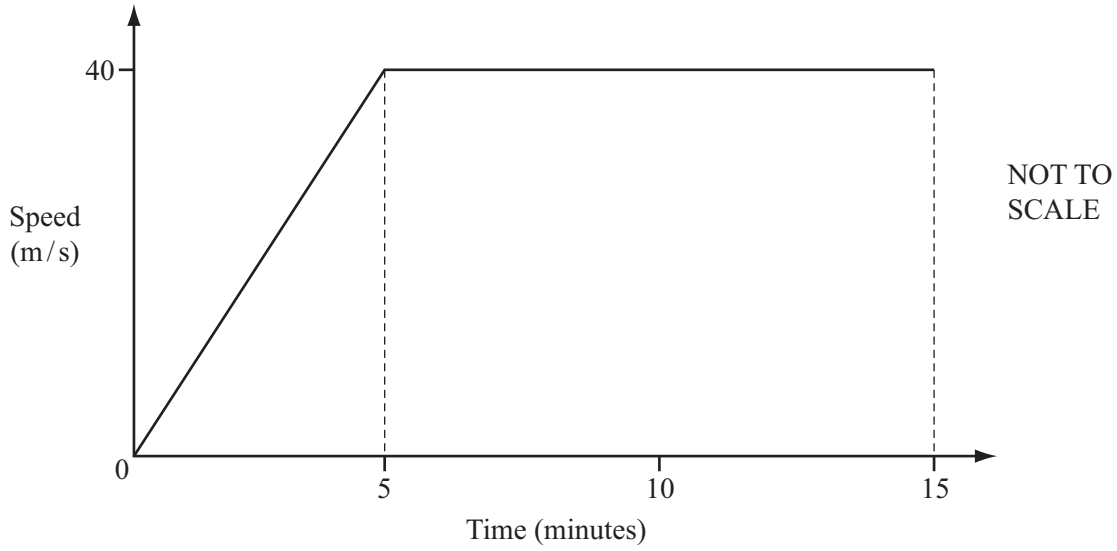
Calculate the area of triangle *CDX*.

Answer(b)(ii) ..... cm^2 [2]

Question 23 is printed on the next page.

23

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The diagram shows the speed-time graph for the first 15 **minutes** of a train journey.
The train accelerates for 5 minutes and then continues at a constant speed of 40 metres/**second**.

(a) Calculate the acceleration of the train during the first 5 minutes.
Give your answer in m/s^2.

Answer(a) ..... m/s^2 [2]

(b) Calculate the average speed for the first 15 minutes of the train journey.
Give your answer in m/s.

Answer(b) ..... m/s [3]

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