CANDIDATE NAME	

CENTER NUMBER		CANDIDATE NUMBER	

MATHEMATICS (US)
0444/21

Paper 2 (Extended)

May/June 2014

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Center number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a #2 pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
CALCULATORS MUST NOT BE USED IN THIS PAPER.
All answers should be given in their simplest form.
If work is needed for any question it must be shown in the space provided.

The number of points is given in parentheses [ ] at the end of each question or part question.
The total of the points for this paper is 70.

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

2

Formula List

For the equation $ax^2 + bx + c = 0$ $\qquad x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

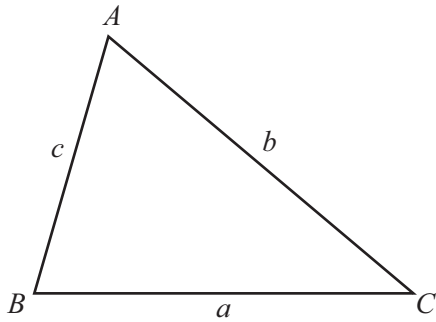Lateral surface area, A, of cylinder of radius r, height h. $\qquad A = 2\pi rh$

Lateral surface area, A, of cone of radius r, sloping edge l. $\qquad A = \pi rl$

Surface area, A, of sphere of radius r. $\qquad A = 4\pi r^2$

Volume, V, of pyramid, base area A, height h. $\qquad V = \dfrac{1}{3}Ah$

Volume, V, of cone of radius r, height h. $\qquad V = \dfrac{1}{3}\pi r^2 h$

Volume, V, of sphere of radius r. $\qquad V = \dfrac{4}{3}\pi r^3$

$\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

$a^2 = b^2 + c^2 - 2bc \cos A$

$\text{Area} = \dfrac{1}{2}bc \sin A$

1 Simplify $\sqrt{\dfrac{9}{16}} + 2^{-1}$.

Answer .... [2]

---

2 $y = \dfrac{x}{2} + x^2$

Find the value of y when $x = 0.1$.

Answer .... [2]

---

3 Solve the equation.

$$\frac{n-8}{2} = 11$$

Answer n = ... [2]

---

4 $p = \dfrac{4.8 \times 1.98276}{16.83}$

(a) In the spaces provided, write each number in this calculation correct to 1 significant figure.

Answer(a)

$$\frac{\text{............} \times \text{............}}{\text{............}}$$

[1]

(b) Use your answer to **part (a)** to estimate the value of p.

Answer(b) .... [1]

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5 Simplify

(a) $\left(3\sqrt{2}\right)^2$,

Answer(a) .... [1]

(b) $\sqrt{24} + \sqrt{54}$.

Answer(b) .... [2]

---

6 Carlo changed 80 euros (€) into dollars when the exchange rate was €1 = $1.50 .
He spent $88.
He changed his remaining dollars back into euros when the exchange rate was €1 = $1.60 .

Work out how many euros he received.

Answer € .... [3]

---

7 Solve for *x*.
$$y = (x - 4)^2 + 6$$

Answer x = ... [3]

---

8   Write as a fraction in simplest form.

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

Answer .... [3]

_____

9   A bus company in Dubai has the following operating times.

Day	Starting time	Finishing time
Saturday	06 00	24 00
Sunday	06 00	24 00
Monday	06 00	24 00
Tuesday	06 00	24 00
Wednesday	06 00	24 00
Thursday	06 00	24 00
Friday	13 00	24 00

(a) Calculate the total number of hours that the bus company operates in one week.

Answer(a) .... h [3]

(b) Write the starting time on Friday in the 12-hour clock.

Answer(b) .... [1]

_____

10 Factor completely.

(a) $ax + ay + bx + by$

Answer(a) .... [2]

(b) $3(x - 1)^2 + (x - 1)$

Answer(b) .... [2]

11
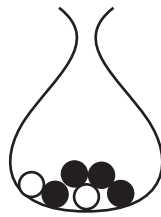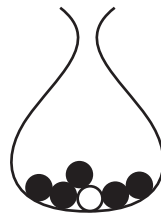
Bag *A*   Bag *B*

Bag *A* contains 2 white beads and 4 black beads.
Bag *B* contains 1 white bead and 5 black beads.
Alex chooses a bag and then takes out a bead at random.

The probability that Alex chooses bag *A* is $\frac{1}{4}$.

Find the probability that Alex chooses a white bead.

Answer .... [3]

12 $p = 4 \times 10^5$ $q = 5 \times 10^4$

Find, giving your answer in scientific form,

(a) pq,

Answer(a) .... [2]

(b) $\dfrac{q}{p}$.

Answer(b) .... [2]

13
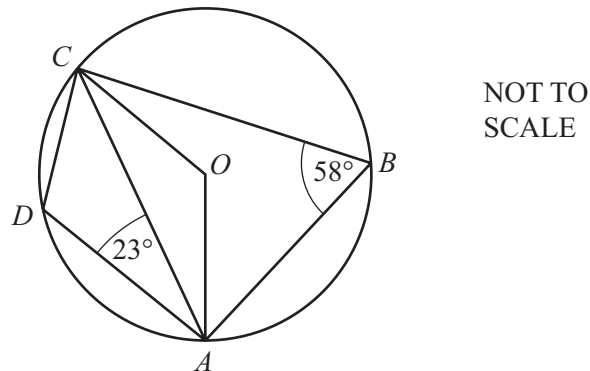
A, *B*, *C* and *D* lie on a circle center *O*.
Angle *ABC* = 58° and angle *CAD* = 23°.

Calculate

(a) angle *OCA*,

Answer(a) Angle *OCA* = ... [2]

(b) angle *DCA*.

Answer(b) Angle *DCA* = ... [2]

14
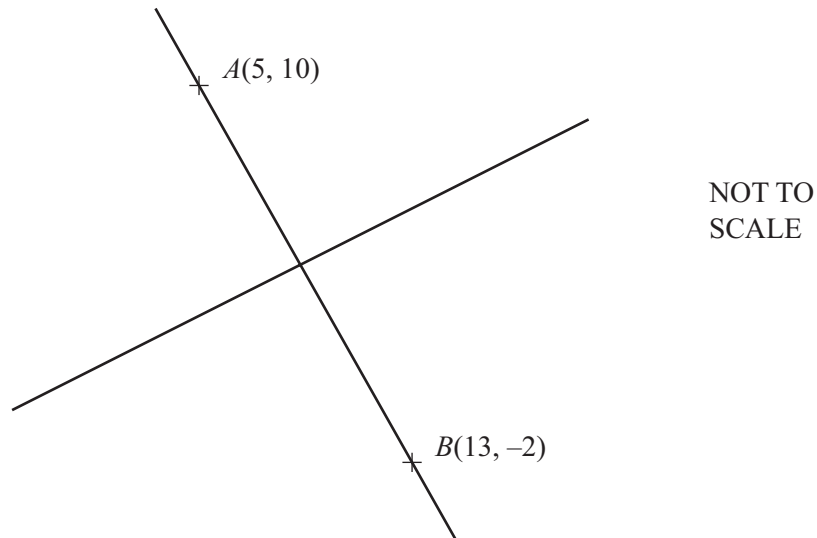
A(5, 10) and *B*(13, –2) are two points on the line *AB*.

The perpendicular bisector of the line *AB* has slope $\frac{2}{3}$.

Find the equation of the perpendicular bisector of *AB*.

Answer .... [4]

15 Solve the inequality for positive integer values of x.

$$\frac{21+x}{5} > x+1$$

Answer .... [4]

---

16 (a) $(2^{24})^{\frac{1}{2}} = p^4$

Find the value of p.

Answer(a) p = ... [2]

(b) Simplify $\dfrac{q^2 + q^2}{q^{\frac{1}{4}} \times q^{\frac{1}{4}}}$.

Answer(b) .... [3]

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NOT TO SCALE
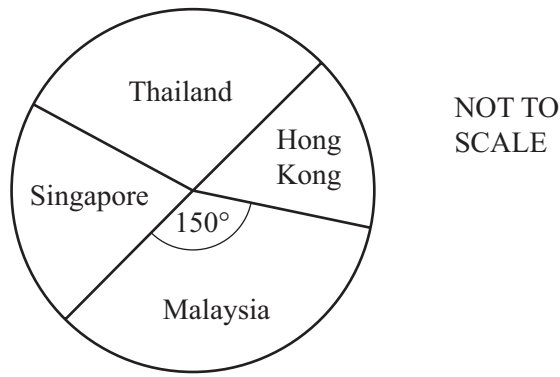
A travel brochure has 72 holidays in four different countries.
The pie chart shows this information.

(a) There are 24 holidays in Thailand.
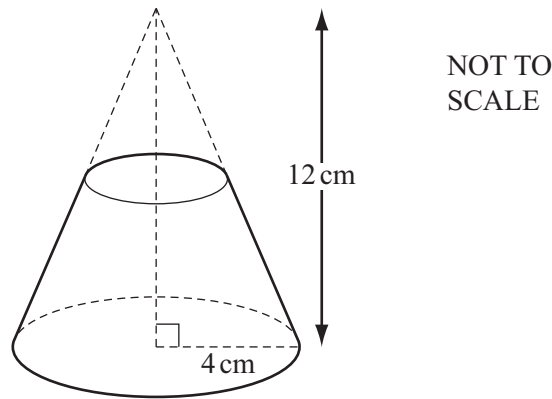
Show that the sector angle for Thailand is 120°.

Answer(a)

[2]

(b) The sector angle for Malaysia is 150°.
The sector angle for Singapore is twice the sector angle for Hong Kong.

Calculate the number of holidays in Hong Kong.

Answer(b) .... [3]

18

A **solid** cone has base radius 4 cm and height 12 cm.
A mathematically similar cone is removed from the top as shown in the diagram.
The volume of the cone that is removed is $\frac{1}{8}$ of the volume of the original cone.

(a) Explain why the cone that is removed has radius 2 cm and height 6 cm.
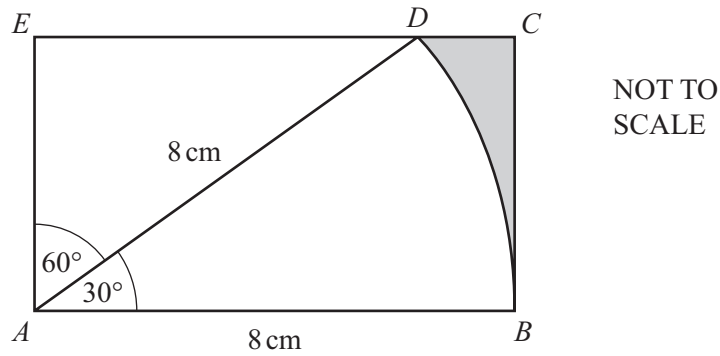
Answer(a)

[2]

(b) The volume of the remaining solid is $k\pi$ cubic centimeters.

Find the value of k.

Answer(b) $k =$ .... [4]

Question 19 is printed on the next page.

19

The diagram shows a rectangle *ABCE*.
D lies on *EC*.
DAB is a sector of a circle radius 8 cm and sector angle 30°.

Find the perimeter of the shaded region in the form $a + b\sqrt{3} + c\pi$.

Answer .... cm [7]