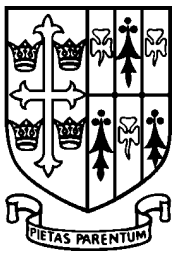
ST EDWARD'S

OXFORD



16+ ENTRANCE EXAMINATION

For entry in

September 2017

Mathematics

Time: 1 hour

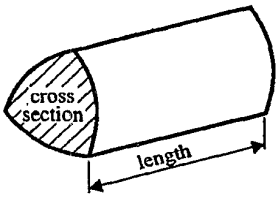
Candidates Name: ……

Instructions to Candidates

- 60 Marks
- Time allowed 1 Hour
- Calculators are allowed
- Write all answers, including your workings, in this booklet

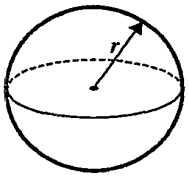
You may use the following formulae:

Volume of prism = area of cross section × length



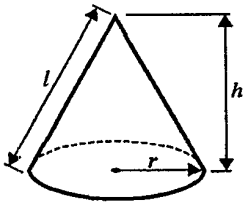
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$



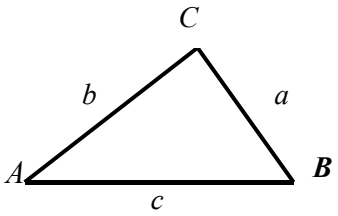
Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = πrl



In any triangle ABC

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



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 $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

1) (a) Solve $6x + 2 = 4(x - 7)$

$x =$ ……..

(2)

(b) Solve $\dfrac{15 - 2x}{3} = 4$

$x =$ ……..

(3)

(c) (i) Factorise $x^2 - 23x + 42$

..……..

(ii) Hence solve $x^2 - 23x + 42 = 0$

……

(3)

(d) Factorise $(x + y)^2 - 3(x + y)$

..……..

(1)

(e) Factorise

$$9x^2 - 6x + 1$$

……

(2)

(f) Simplify

$$\frac{6x^2 + 7x - 3}{9x^2 - 6x + 1}$$

……

(3)

(Total 14 marks)

2)

$$\frac{1}{5^3} = 5^p \qquad 1 = 5^q \qquad \sqrt{5^3} = 5^r$$

(a) Write down the value of

(i) p

p = ...

(ii) q

q = ...

(iii) r

r = ...

(3)

(b) Show that

$$\frac{14}{\sqrt{245}} = \frac{2\sqrt{5}}{5}$$

You must write down each stage of your working.

(2)

$(e - 2\sqrt{3})^2 = f - 20\sqrt{3}$ where e and f are integers.

(c) Find the value of e and the value of f

e = ...

f = ...

(3)

(Total 8 marks)

3) A straight line, **L**, passes through the point with coordinates (4, 7) and is perpendicular to the line with equation $y = 2x + 3$.

Find an equation of the straight line **L**.

……

(Total 3 marks)

4) Find the coordinates of the point of intersection of the line with equation $3x + 4y = 10$ and the line with equation $5x - 6y = 23$
Show your working clearly.

(..... , ...)

(Total 6 marks)

5)

a) $\frac{7x}{3} + \frac{3x}{4}$

……

b) $\frac{2x-5}{3} - \frac{4x+1}{7}$

……

(Total 5 marks)

6) Solve the equation

$$\frac{7}{x+2} + \frac{1}{x-1} = 4$$

……

(Total 6 marks)

7) Solve the simultaneous equations

$x^2 + y^2 = 26$

$y = 3 - 2x$

Show clear algebraic working.

.....

(Total 6 marks)

8)

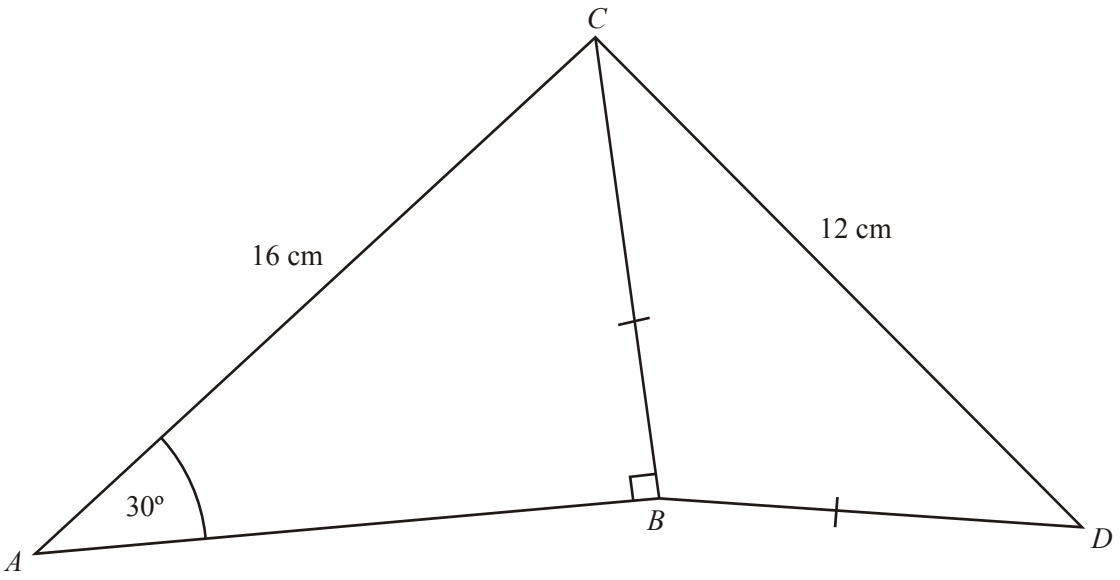


Diagram **NOT** accurately drawn

$AC = 16$ cm
Angle $ABC = 90°$
Angle $CAB = 30°$

$BC = BD$
$CD = 12$ cm

Calculate the area of triangle BCD.
Give your answer correct to 3 significant figures.

…… cm^2

(Total 5 marks)

9)

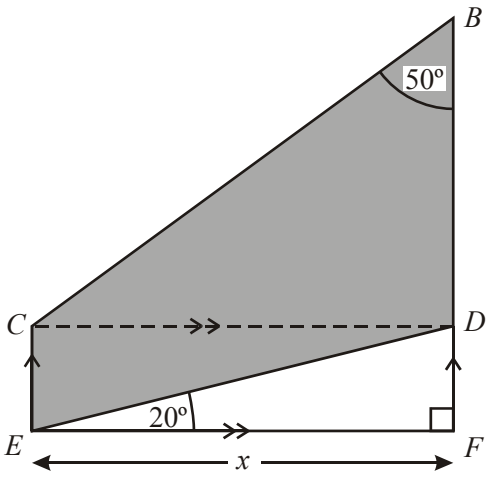


Diagram **NOT** accurately drawn

BCEF is a trapezium.
EC is parallel to *FDB*.
CD is parallel to *EF*.
Angle *CBD* = 50°. Angle *DEF* = 20°. Angle *EFD* = 90°.

EF = *x*.

(a) Express, in terms of *x*,

(i) the length of *DF*,

…….

(ii) the area of triangle *DEF*.

…….

(3)

(b) Work out the percentage of the trapezium *BCEF* that is **not** shaded.

……. %

(4)
(Total 7 marks)

END OF TEST