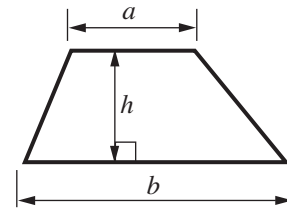


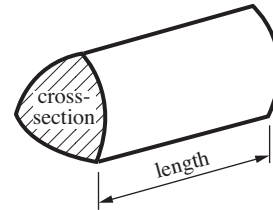


## Formulae Sheet: Higher Tier

**Area of trapezium** =  $\frac{1}{2}(a + b)h$



**Volume of prism** = (area of cross-section)  $\times$  length

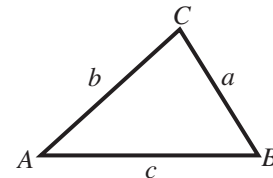


**In any triangle ABC**

**Sine rule**  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

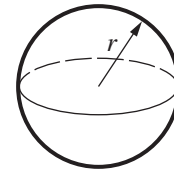
**Cosine rule**  $a^2 = b^2 + c^2 - 2bc \cos A$

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



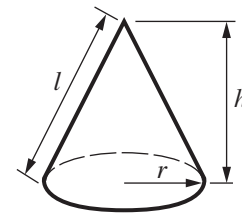
**Volume of sphere** =  $\frac{4}{3}\pi r^3$

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



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

**Curved surface area of cone** =  $\pi r l$



**The Quadratic Equation**

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

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

**PLEASE DO NOT WRITE ON THIS PAGE**

1 You are given that  $4.32 \times 1.65 = 7.128$ .

Use this result to find the answers to these calculations.

(a)  $43.2 \times 165$

(a) ..... [1]

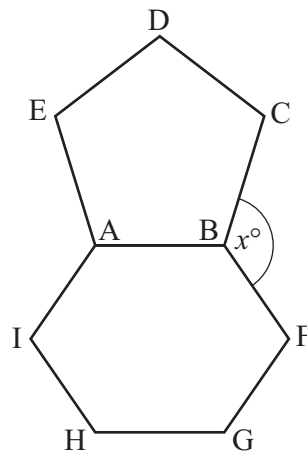
(b)  $432 \times 0.165$

(b) ..... [1]

(c)  $7128 \div 0.432$

(c) ..... [1]

2



Not to scale

ABCDE is a regular pentagon and ABFGHI is a regular hexagon.

Work out the value of  $x$ .

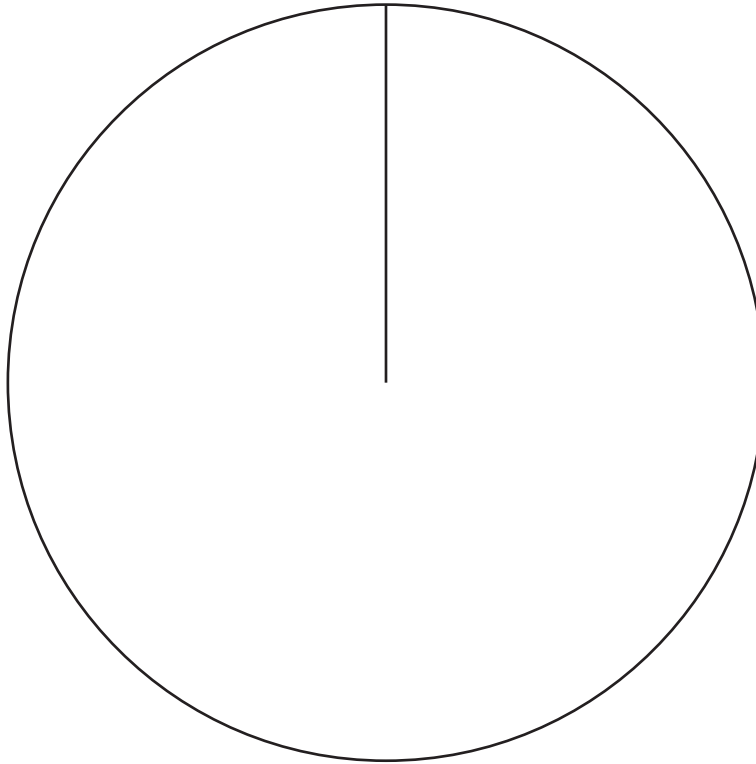
..... [3]

- 3 Wasim asked the students in his year group, “What is your favourite leisure activity?”

These are the results.

Leisure activity	Frequency
Sport & exercise	43
Watching TV	62
Using a computer	51
Reading	16
Other	8

- (a) Draw a pie chart to illustrate this information.



[4]

- (b) One of these pupils is chosen at random.

What is the probability that this pupil preferred watching TV or using a computer?

(b) ..... [2]

4 (a) Expand the following.

(i)  $x(5 - x)$

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

(ii)  $(x + 3)(x - 2)$

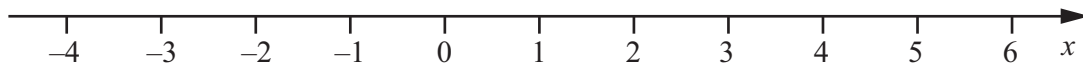
(ii) ..... [2]

(b) (i) Solve this inequality.

$$6x < 4x + 9$$

(b)(i) ..... [2]

(ii) Represent your answer to part (b)(i) on this number line.



[1]

- 5 (a) Expressed as a product of its prime factors,  $150 = 2 \times 3 \times 5 \times 5$ .

Express 160 as a product of its prime factors.

(a) ..... [2]

- (b) Use part (a) to answer the following.

- (i) Jelly Babies are sold in packets of 150.  
Liquorice Allsorts are sold in packets of 160.

Janie bought some packets of sweets. She bought the same number of Jelly Babies as Liquorice Allsorts.

What is the least number of packets of Jelly Babies that Janie could have bought?

(b)(i) ..... [2]

- (ii) Explain why  $\frac{7}{150}$  converts to a recurring decimal but  $\frac{7}{160}$  converts to a terminating decimal.

.....  
.....  
.....  
..... [2]

6 Here are the first five numbers in a sequence.

2      9      16      23      30

(a) Explain why the  $n$ th term of the sequence is given by

$$T = 7n - 5.$$

.....  
 .....  
 ..... [2]

(b) Make  $n$  the subject of this formula.

$$T = 7n - 5$$

(b) ..... [2]

(c) Use your answer to part (b) to decide whether these numbers are terms of the sequence.  
 Explain your answers.

(i) 478

..... because .....  
 .....  
 ..... [1]

(ii) 700

..... because .....  
 .....  
 ..... [1]

- 7 (a) Write 0.000 007 89 in standard form.

(a) ..... [1]

- (b) This table shows the areas of Africa and Asia and their populations in 2008.

	Africa	Asia
Area (km <sup>2</sup> )	$3.04 \times 10^7$	$4.38 \times 10^7$
Population	$9.22 \times 10^8$	$3.88 \times 10^9$

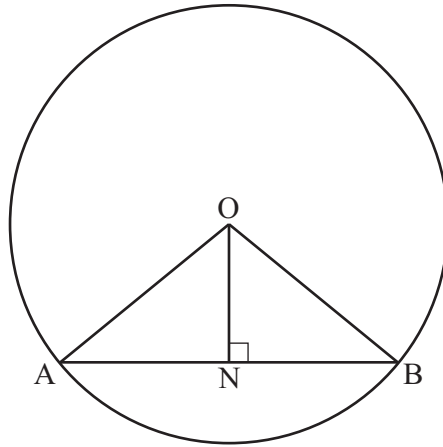
- (i) Calculate the total population of Africa and Asia in 2008.  
Give your answer in standard form.

(b)(i) ..... [2]

- (ii) Calculate an **estimate** of the population density, in people/km<sup>2</sup>, of Africa in 2008.

(ii) ..... people/km<sup>2</sup> [2]





In the diagram, O is the centre of the circle, AB is a chord and ONB is a right angle.

Prove, using congruent triangles, that  $AN = NB$ .

.....

.....

.....

.....

.....

.....

..... [4]

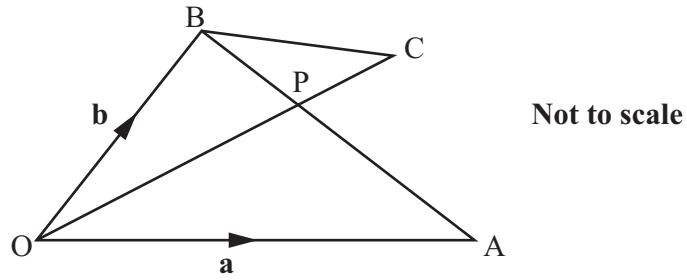
- 9 There are 5 apples, 5 oranges and 5 pears in a bag.  
Angie takes one of the fruits at random.  
Chen then takes one of the remaining fruits at random.

(a) What is the probability that Angie takes an apple and Chen takes a pear?

(a) ..... [2]

(b) What is the probability that they each take a different type of fruit?

(b) ..... [4]



In the diagram,  $\vec{OA} = \mathbf{a}$  and  $\vec{OB} = \mathbf{b}$ .  
 $BP = \frac{1}{3}BA$  and  $OC = \frac{3}{2}OP$ .

(a) (i) Find  $\vec{OP}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$ .

(a)(i) ..... [2]

(ii) Find  $\vec{BC}$  in terms of  $\mathbf{a}$  and  $\mathbf{b}$ .  
 Write your answer as simply as possible.

(ii) ..... [2]

(b) State one conclusion you can make about the lines BC and OA.

..... [1]

**PLEASE DO NOT WRITE ON THIS PAGE**



**Copyright Information**

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website ([www.ocr.org.uk](http://www.ocr.org.uk)) after the live examination series. If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact the Copyright Team, First Floor, 9 Hills Road, Cambridge CB2 1GE.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.