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**GENERAL CERTIFICATE OF SECONDARY EDUCATION
MATHEMATICS SYLLABUS A**

J512/01

Paper 1 (Foundation Tier)

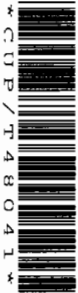
MONDAY 19 MAY 2008

Morning
Time: 2 hours

Candidates answer on the question paper
Additional materials (enclosed): None

Solutions

Additional materials (required):
Geometrical instruments
Tracing paper (optional)



Candidate
Forename

Candidate
Surname

Centre
Number

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Candidate
Number

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INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Show your working. Marks may be given for a correct method even if the answer is incorrect.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **100**.



WARNING
You are not allowed to use a
calculator in this paper.

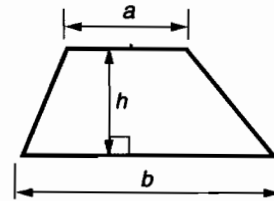
FOR EXAMINER'S USE

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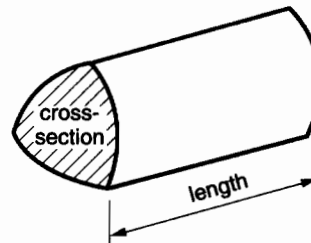
This document consists of **19** printed pages and **1** blank page.

Formulae Sheet: Foundation Tier

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



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



PLEASE DO NOT WRITE ON THIS PAGE

- 1 The history of Ely Cathedral goes back 1335 years.



- (a) Write 1335 using words.

One thousand three hundred and thirty five

[1]

The Octagon Tower weighs one hundred and eighty thousand kilograms.

- (b) Write in figures one hundred and eighty thousand.

(b) 180 000 [1]

The Octagon Tower was added to the cathedral in the year 1400.

- (c) How many years old is the Octagon Tower? 2010 - 1400

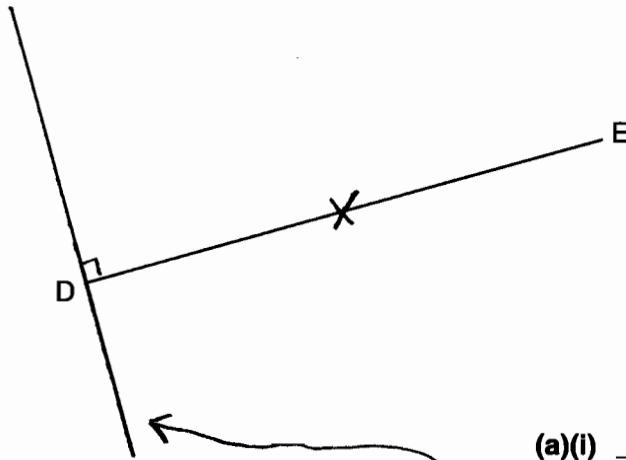
(c) 610 [1]

The West Tower is 215 feet high.

- (d) What is the value of the 2 in the number 215?

(d) 200 [1]

2 (a) (i) Measure the length of line DE in centimetres.

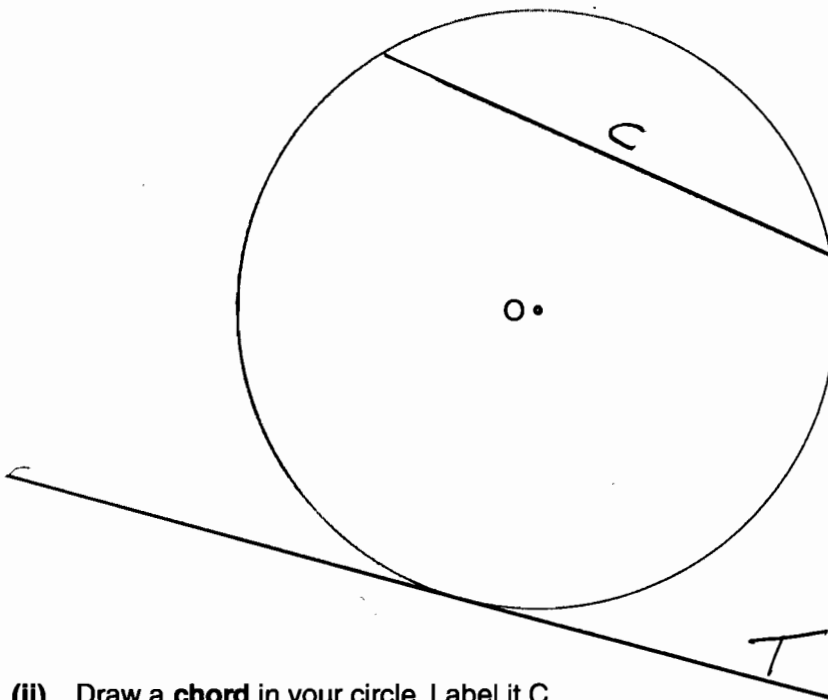


(a)(i) 7 cm [1]

(ii) Mark with a cross (X) the midpoint of line DE. [1]

(iii) Draw a line that is **perpendicular** to line DE. [1]

(b) (i) Draw a circle, centre O, with radius 4 cm. [1]



(ii) Draw a **chord** in your circle. Label it C. [1]

(iii) Draw a **tangent** to your circle. Label it T. [1]

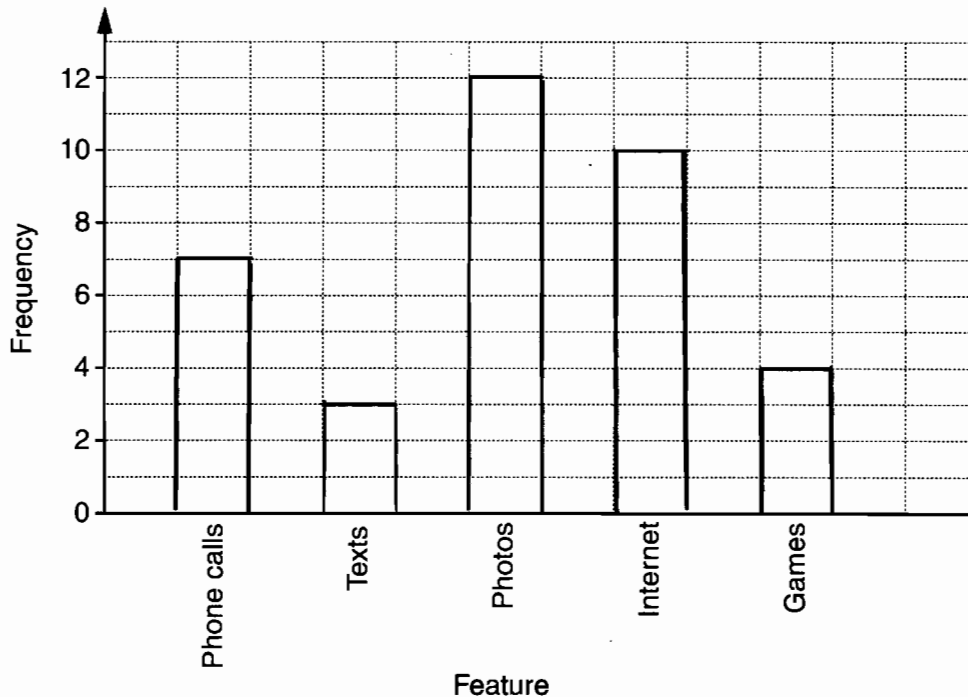
- 3 Mike asked his friends which feature they used most on their mobile phones. He recorded the results in a tally table.

- (a) Complete the frequency column in the table below.
The first two values are done for you.

Feature	Tally	Frequency
Phone calls		7
Texts		3
Photos		12
Internet		10
Games		4

[1]

- (b) Show this information on a bar chart.



[2]

- (c) Which was the most popular feature?

(c) Photos [1]

- (d) How many more of Mike's friends said Phone calls than Texts?

7-3
(d) 4 [1]

- (e) How many friends did Mike ask?

7+3+12+10+4
(e) 36 [2]

4 Work out.

(a) $288 + 317$

$$\begin{array}{r} 288 \\ 317 + \\ \hline 605 \\ \hline \end{array}$$

(a) 605 [1]

(b) $635 - 151$

$$\begin{array}{r} 5 \cancel{6} 35 \\ 151 - \\ \hline 484 \\ \hline \end{array}$$

(b) 484 [1]

(c) $119 \div 7$

$$7 \overline{) 119} \begin{array}{r} 017 \\ \underline{119} \\ 0 \end{array}$$

(c) 17 [1]

(d) 26×45

You must show your working.

$$\begin{array}{r} 26 \\ 45 \\ \hline 130 \\ 1040 \\ \hline 1170 \end{array} \quad \text{or} \quad \begin{array}{r} 20 \quad 6 \\ 40 \quad \boxed{800 \quad 240} \quad 800 \\ 5 \quad \boxed{100 \quad 30} \quad 240 \\ \hline 1000 \quad 30 \\ \hline 1170 \end{array}$$

(d) 1170 [3]

5 Caroline is making matchstick patterns.

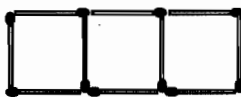
Pattern 1



Pattern 2



Pattern 3



Pattern 4



(a) In the space above draw Pattern 4.

[1]

Caroline counts the number of matchsticks in each pattern.

Pattern	1	2	3	4	5
Number of matchsticks	4	7	10	13	16

(b) Complete the table above.

[2]

(c) How many matchsticks will be in Pattern 10? Explain how you worked out your answer.

31 matchsticks because you need to add on another 5 lots of 3 so $16 + 15 = 31$

[2]

(d) Caroline tries to find one of these Patterns that has a number of matchsticks that is a multiple of 3.

Is this possible? Give a reason for your answer.

No because every answer is 1 more than a multiple of 3

[2]

6 Work out.

(a) the square of 6

$$6^2 = 6 \times 6 = 36$$

(a) 36 [1](b) $\sqrt{64}$

$$\sqrt{64} = 8$$

(b) 8 [1]

(c) 90% of £20

$$10\% \text{ of } \pounds 20 = \pounds 2$$

$$90\% \text{ of } \pounds 20 = \pounds 2 \times 9 = \pounds 18$$

(c) £ 18 [2](d) $\frac{3}{8}$ of 32

$$32 \div 8 = 4$$

$$4 \times 3 = 12$$

(d) 12 [2]

(e) the cube root of 27

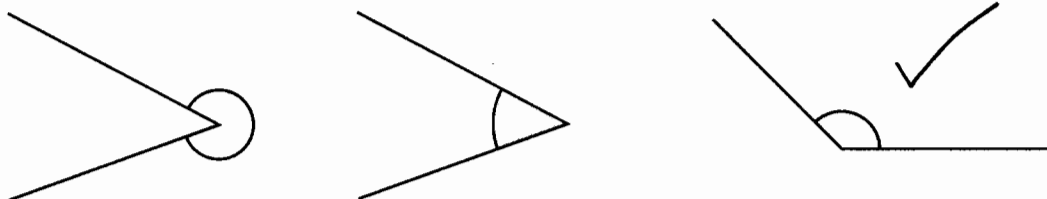
$$\sqrt[3]{27} = 3 \text{ because } 3 \times 3 \times 3 = 27$$

(e) 3 [1]

(f) the next prime number after 23

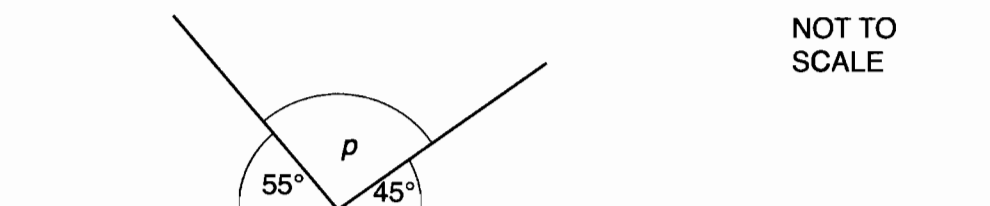
(f) 29 [1]

- 7 (a) Which of these three angles is obtuse?
Put a tick (✓) by the correct one.



[1]

- (b) Calculate the size of angle p .



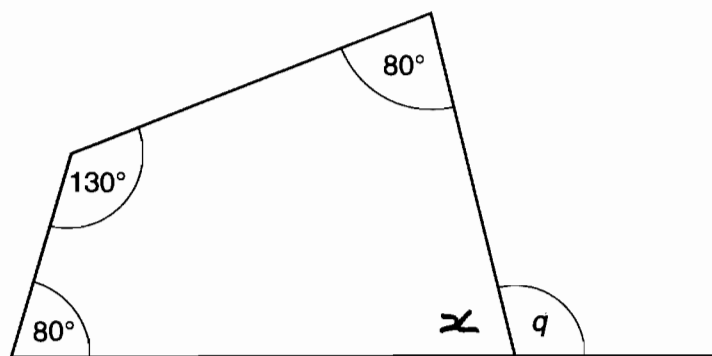
NOT TO SCALE

$$55^\circ + 45^\circ = 100^\circ$$

$$180^\circ - 100^\circ = 80^\circ$$

(b) 80° [1]

- (c) Calculate the size of angle q .
Give reasons for your answer.



NOT TO SCALE

Find x first $x = 360 - (80 + 130 + 80)$

$$x = 360 - 290 = 70$$

$q = 110$ ° because $q = 180 - 70 = 110$ °

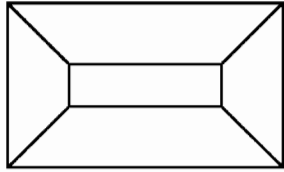
Angles of a quadrilateral add up to 360°

Angles on a straight line add up to 180°

[5]

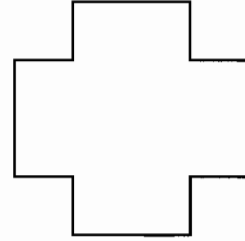
- 8 For each of these shapes write down
the number of lines of symmetry
and
the order of rotational symmetry.

The first one is done for you.



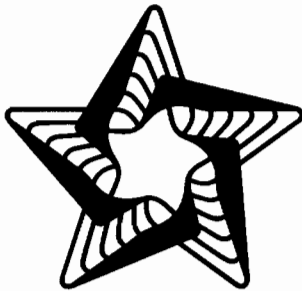
Lines of symmetry 2

Rotational symmetry order 2



Lines of symmetry 4

Rotational symmetry order 4



Lines of symmetry 0

Rotational symmetry order 5



Lines of symmetry 1

Rotational symmetry order 1

[6]

- 9 At a school disco, cans of drink cost 50p and bags of crisps cost 40p. Kiron buys 3 cans of drink and some bags of crisps. He pays with a £5 note and gets £1.90 change.

How many bags of crisps did he buy?

$$3 \text{ cans of drink} = 3 \times 50p = \pounds 1.50$$

$$\text{Total cost } \pounds 5 - \pounds 1.90 = \pounds 3.10$$

$$\text{Crisps cost } \pounds 3.10 - \pounds 1.50 = \pounds 1.60$$

$$\pounds 1.60 \div 40p = 4 \quad \text{so } 4 \text{ packets of crisps}$$

4

[4]

- 10 (a) Find the value of $8t + 3v$ when

- (i) $t = 2$ and $v = 6$,

$$8(2) + 3(6)$$

$$= 16 + 18 = 34$$

(a)(i) 34 [2]

- (ii) $t = 3$ and $v = -7$.

$$8(3) + 3(-7)$$

$$= 24 - 21 = 3$$

(ii) 3 [2]

- (b) Solve.

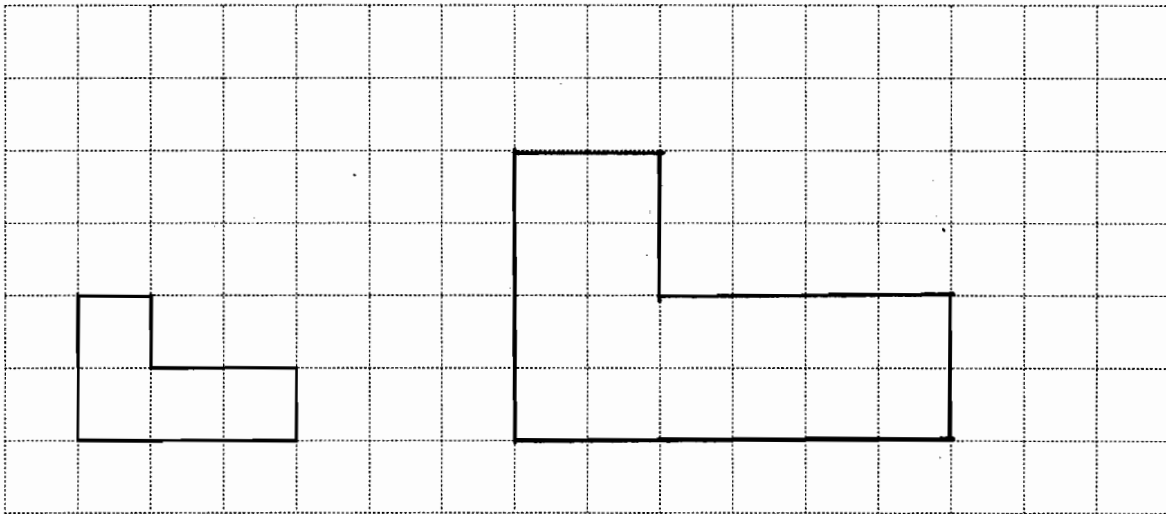
$$\frac{x}{6} = 10$$

$$x = 10 \times 6$$

$$x = 60$$

(b) $x = 60$ [1]

- 11 (a) On the grid below, enlarge the shape using scale factor 2.



[2]

- (b) Use ruler and compasses to construct a triangle with sides 8 cm, 7 cm and 5 cm.
Leave in all your construction lines.

[3]

12 This stem and leaf diagram shows the heights, in cm, of 26 bean plants.

0	7	9					
1	2	2	4	5	7	8	8
2	0	1	3	3	5	9	9
3	1	1	1	4	6	6	7
4	0	1	4				

Key: 1 | 2 represents 12

(a) What is the height of the shortest plant?

(a) 7 cm [1]

(b) What is the range of these heights?

$$44 - 7 = 37$$

(b) 37 cm [1]

(c) What is the median height?

Median between 13th and 14th
between 23 and 25

(c) 24 cm [2]

13 Work out.

(a) 0.2×0.7

$$\begin{array}{r} 0.2 \\ 0.7 \times \\ \hline 0.14 \end{array}$$

(a) 0.14 [1]

(b) $\frac{9}{10} \times \frac{1}{3}$

Give your answer in its simplest form.

$$\frac{\cancel{9}^3}{10} \times \frac{1}{\cancel{3}_1} = \frac{3 \times 1}{10 \times 1} = \frac{3}{10}$$

(b) $\frac{3}{10}$ [2]

- 14 (a) A 100g box of breakfast cereal contains 20g of fruit and 80g of oats.

Write the ratio of fruit to oats in its simplest form.

$$\begin{array}{l} 20 : 80 \\ = 1 : 4 \end{array}$$

(a) 1 : 4 [1]

- (b) What weight of fruit is in a 250g box of the same cereal?

$$\begin{array}{l} 5 \text{ parts} = 250\text{g} \quad (\text{Total parts} = 1+4=5) \\ 1 \text{ part} = 250 \div 5 = 50\text{g} \end{array}$$

(b) 50g g [2]

- (c) As a special offer, the 250g of cereal is increased by 20%.

What weight of cereal is in the special offer box?

$$\begin{array}{l} 10\% \text{ of } 250\text{g} = 25\text{g} \\ 20\% \text{ of } 250\text{g} = 50\text{g} \\ 250 + 50 = 300\text{g} \end{array}$$

(c) 300 g [3]

- 15 (a) The probability that Rovers will win their next match is 0.6.
The probability that Rovers will lose their next match is 0.15.

Work out the probability that Rovers will draw their next match.

$$0.6 + 0.15 = 0.75$$

$$1 - 0.75 = 0.25$$

(a) 0.25 [2]

- (b) A weather man says 'There is a 40% chance of rain today.'
Tracy says 'That means there is a 60% chance of it being sunny today.'

Explain why Tracy is **not** correct.

Probabilities must add to 1 but it could
be other types of weather such as cloud or [1]
snow

16 ABCDEFGH is a cuboid.

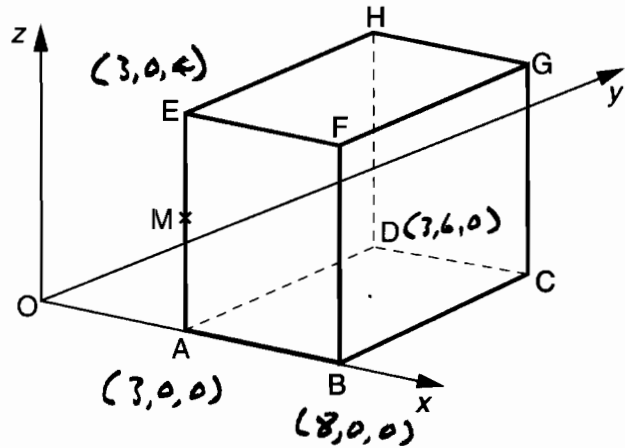
With the x , y and z axes shown,

A is the point $(3,0,0)$,

B is the point $(8,0,0)$,

D is the point $(3,6,0)$,

E is the point $(3,0,4)$.



(a) Write down the coordinates of

(a)(i) C (8 , 6 , 0) [1]

(ii) F (8 , 0 , 4) [1]

(iii) G (8 , 6 , 4) [1]

(b) Work out the coordinates of M, the midpoint of AE.

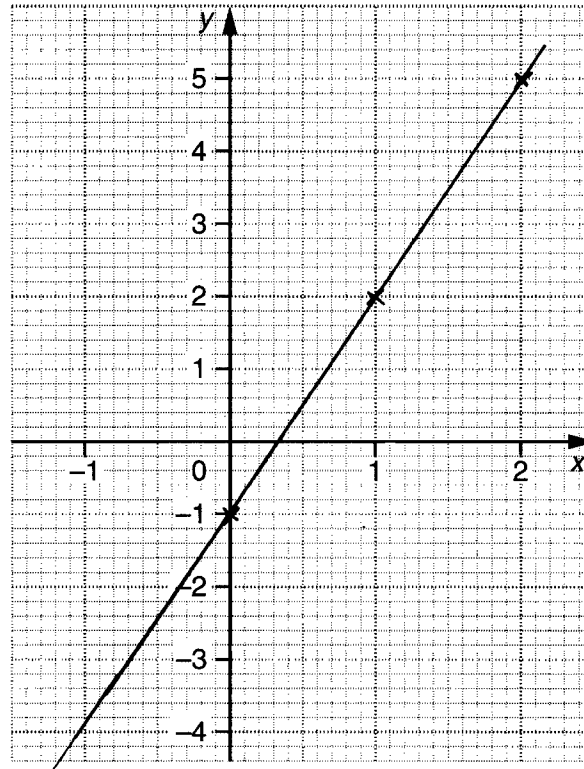
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(b) (3 , 0 , 2) [2]

- 17 (a) (i) Draw the graph of $y = 3x - 1$.
You may use the table below to help you.

x	0	1	2
y	-1	2	5



[3]

- (ii) Use your graph to solve the equation $3x - 1 = 0$.

(a)(ii) $x = 0.35$ [1]

- (b) Rearrange $y = 3x - 1$ to make x the subject.

$$y = 3x - 1$$

$$y + 1 = 3x$$

$$y + 1 = 3x$$

$$\frac{y + 1}{3}$$

(b) $x = \frac{y + 1}{3}$ [2]

18 (a) Multiply out.

$3(2x-5)$

$6x - 15$

$(a) \underline{6x - 15} \quad [1]$

(b) Factorise completely.

$4a + 2ac$

$2a(2+c)$

$(b) \underline{2a(2+c)} \quad [2]$

19 (a) Write 200 as a product of its prime factors, using powers.

$$\begin{array}{r}
 2 \overline{) 200} \\
 \underline{2 \quad 00} \\
 2 \overline{) 00} \\
 \underline{2 \quad 00} \\
 5 \overline{) 25} \\
 \underline{5 \quad 0} \\
 5 \overline{) 5} \\
 \underline{5 \quad 0} \\
 1
 \end{array}$$

$$\begin{aligned}
 200 &= 2 \times 2 \times 2 \times 5 \times 5 \\
 &= 2^3 \times 5^2
 \end{aligned}$$

$(a) \underline{2^3 \times 5^2} \quad [3]$

(b) Simplify each of the following.

$$(i) \quad y^5 \times y^3 = y^{5+3} = y^8$$

$(b)(i) \underline{y^8} \quad [1]$

$$(ii) \quad \frac{y^5}{y^3} = y^{5-3} = y^2$$

$(ii) \underline{y^2} \quad [1]$