1. This table shows some expressions.

The letters x, y and z represent lengths.

Place a tick in the appropriate column for each expression to show whether the expression can be used to represent a length, an area, a volume or none of these.

Expression	Length	Area	Volume	None of these
$x + y + z$				
xyz				
$xy + yz + xz$				

(Total 3 marks)

2. Here are some expressions.

$\frac{1}{2}ac$	πc	$2b$	$2ab^2$	abc	$a(b + c)$	$\frac{ab}{c}$	πa^2

The letters a, b and c represent lengths.
π, 2 and $\frac{1}{2}$ are numbers which have no dimensions.
Three of the expressions could represent areas.
Tick (✓) the boxes underneath the **three** expressions which could represent areas.

(Total 3 marks)

3. Here are some expressions.

$\frac{\pi r^3}{x}$	$\frac{r^3}{\pi}$	$\pi x + r$	$\pi r2 + rx$	$\pi(x + r)$	$\frac{\pi^3}{x^2}$

The letters r and x represent lengths, π is a number that has no dimensions.

Tick (✓) the boxes underneath the **two** expressions that can represent areas.

(Total 2 marks)

4. The table shows some expressions.

Expression	**Length**	**Area**	**Volume**	**None of these**
πab				
$a + 2b$				
$\pi a^2 + b$				

The letters a and b represent lengths.
π and 2 are numbers that have no dimensions.

Place a tick (✓) in the correct column to show whether the expression can be used to represent a length, an area, a volume or none of these.

(Total 3 marks)

5.

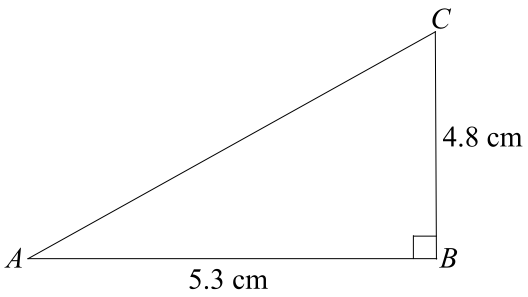

Diagram **NOT** accurately drawn

In triangle ABC, angle $ABC = 90°$.
$AB = 5.3$ cm, correct to 2 significant figures.
$BC = 4.8$ cm, correct to 2 significant figures.
The base, AB, of the triangle is horizontal.

(a) (i) Calculate the lower bound for the gradient of the line AC.

.....

(ii) Calculate the upper bound for the gradient of the line AC.

.....

(3)

(b) Use your answers to part (a) to give the gradient of the line AC to an appropriate degree of accuracy.
You must explain your answer.

.....

.....

.....

(2)
(Total 5 marks)

6. The table shows some expressions.
In each expression, n is a whole number.

$3n^2$	$9n$	$3 \times 6n$	$3 + 6n$	$(3n)^2$	$n + 9$

Tick (✓) the box underneath each of the **three** expressions which are always multiples of 9
(Total 3 marks)

7. The table shows some expressions.
a, b, c and d represent lengths.
π and 2 are numbers that have no dimensions.

abc	$\frac{ab}{2}$	πbc	πd	$ab + cd$	$\pi(a + b)$	bc^2

Three of the expressions could represent areas.

Tick (✓) the boxes underneath these three expressions.

(Total 3 marks)

8. Here are some expressions.

$(a + b)c$	$ac + b$	$2abc$	$\pi a^2 + \pi b^2$	$2\pi c$

The letters a, b, and c represent lengths. π and 2 are numbers that have no dimension.

Two of the expressions could represent areas.

Tick the boxes (✓) underneath these two expressions.

(Total 2 marks)

9. The table shows some expressions.

p, q and r represent lengths.
π, 2, 3 and 4 are values that have no dimension.

Place a tick (✓) in the appropriate column for each expression to show whether the expression can be used to represent a length, an area, a volume or none of these.

Expression	**Length**	**Area**	**Volume**	**None of these**
$3pqr$				
$4p + 2q$				
πr^2				

(Total 3 marks)

10. The table shows some expressions.
a, b, and c represent lengths.
π, 2 and 5 are numbers which have no dimensions.

$\frac{\pi b^2}{a}$	$5c^2$	$\pi(a + b)$	$ab + bc$	πabc	$2\pi ac^2$
☒	☒	☒	☒	☒	☒

Put a cross (☒) in the boxes underneath the **two** expressions which could represent area.

(Total 2 marks)

1. Length
Volume
Area 3

B1 for Length
B1 for Volume
B1 for Area

[3]

2. $\frac{1}{2}ac$, $a(b + c)$, πa^2 3

B3 B1 × 3 (deduct B1 for each additional expression (>3) to min 0)

[3]

3. 1st, 4th 2

B1 for 1st
B1 for 4th
NB: –B1 for each additional box ticked, to a minimum of 0.

[2]

4. Area 3

B1 for Area only

Length

B1 for Length only

None of these

B1 for None of these only

[3]

5. (a) (i) $\frac{4.75}{5.35}$
= 0.887850467

B3 LB – 0.8878–0.888 and UB – 0.9238 – 0.924
(B2 one of LB or UB correct)

(ii) $\frac{4.85}{5.25}$ 3

= 0.923809523

(B1 sight of one of 4.75, 5.35, 4.85, 5.25)
SC: B2 correct answers in wrong order

(b) 0.9 2

B1 dep on two correct bounds for gradient

Bounds agree to 1 dp

B1 dep on two correct bounds for gradient

[5]

6. $9n$, $3 \times 6n$, $(3n)^2$ 3

B1 each correct value (–B1 each tick over 3, to a minimum of B0).

[3]

7. $\frac{ab}{2}$, πbc, $ab + cd$ 3

B1 for $\frac{ab}{2}$*; B1 for* πbc*; B1 for* $ab + cd$

(–B1 for each additional expression ticked (>3) to a minimum of 0)

[3]

8. $(a + b)c$ and
$\pi a^2 + \pi b^2$ 2

B1 for each correct answer
(–1 for each extra answer)

[2]

9. volume
length
area 3

B1 cao
B1 cao
B1 cao

[3]

10. $5c^2$
$ab + bc$ 2

B2 for both correct, no extras
(B1 for 1 correct out of 1 or 2 answers)
NB: If more than 3 crosses, deduct 1 mark for each extra to a minimum of zero.

[2]

1. Paper 3

This is a question that is rarely done well from year to year, and this year was no exception, with few candidates showing any real understanding of dimensions. This question is also a test of whether candidates can follow instructions, and sadly many failed in this respect also, ticking many squares in the table.

Paper 5

The first two expressions were normally correctly identified as 'length' and 'volume' but the expression '$xy + yz + xz$' was frequently not identified as 'area'. It was frequently linked to 'None of these'.

2. Paper 3

Only the more able candidates gained full marks in this question but the majority of candidates identified one or two correct expressions. '$2ab^2$' and 'abc' were common incorrect answers.

Paper 5

Although this question on dimensions was usually answered well, a common wrong answer was to replace '$a(b + c)$' by '$2ab^2$' as an expression which represented an area.

3. Intermediate Tier

Few candidates obtained full marks. Sometimes completion of the question appeared to be almost random.

Higher Tier

This was generally well done. Most candidates just ticked the correct boxes. A few showed some working, usually by changing all the letters to the same letter and cancelling appropriately.

4. Paper 5523

Almost three quarters of candidates gained at least one mark but relatively few gained all three marks. Some candidates placed more than one tick in a row.

Paper 5525

Most candidates were able to gain at least one mark for this question- usually for identifying πab as an area. Candidates were less successful at identifying $\pi a^2 + b$ as "None of these", which was usually given as an area.

5. This question proved to be a challenge for candidates. One major source of difficulty was with the lack of knowledge of how to find a gradient. Many candidates calculated the length of the slope *AC,* interpreting the word 'gradient' in its colloquial meaning. Others found the angle *CAB,* by using tan. Some candidates know that gradient was the quotient of 2 values, but inverted the x and y values. Nearly all candidates where able to quote correct lower bounds and upper bounds for the base and the height. For part (b) there were a pleasing number of candidates who understood the significance of successively rounding the lower and upper bounds until they agree.

6. Most candidates ticked the $9n$, but the $n + 9$ was a distracter for many. $3 + 6n$ and $(3n)^2$ attracted attention, but usually only one of these was ticked.

7. Most candidates were able to score at least one mark by selecting one correct expression representing an area. In many cases this was probably more by luck than by actually understanding the underlying concept of dimensional analysis.

8. The majority of candidates usually gained 1 and sometimes 2 marks in this question. There was a variety of answers offered with no particular single answer preferred; $2abc$ was selected the least number of times.

9. Over 90% of candidates were able to gain some credit for their answers to this question. The formula for length caused the most difficulty.

10. ust under 19% of candidates correctly identified both expressions that could represent area with 46% of candidates correctly identifying one expression.