Name: _____

Similar Triangles

and other 2D shapes

**Date:**

Solutions

**Time:**

**Total marks available:**

**Total marks achieved: _____**

## Questions

Q1.

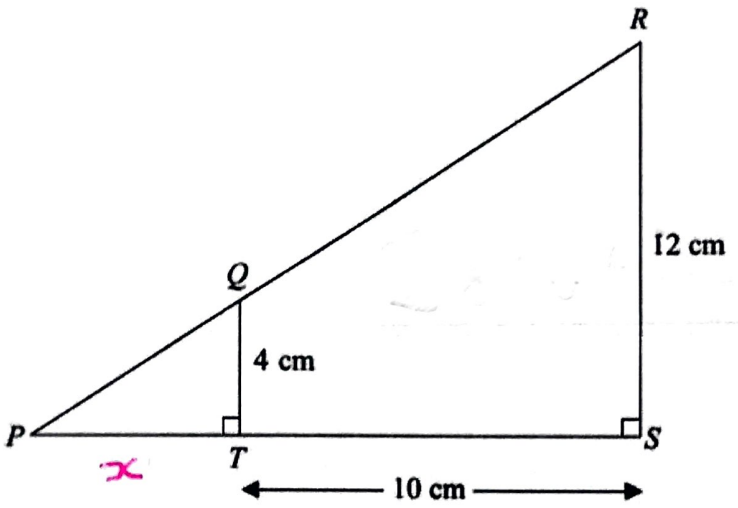



Diagram NOT accurately drawn

*PQR* and *PTS* are straight lines.
Angle *PTQ* = Angle *PSR* = 90°
*QT* = 4 cm
*RS* = 12 cm
*TS* = 10 cm

(a) Work out the area of the trapezium *QRST*.

$A = \frac{(a+b)h}{2}$

$= \frac{(4+12)\times 10}{2}$

80 ..... cm²

**(2)**

(b) Work out the length of *PT*.

Let PT = x

△s PQT are similar PRS

Ratio of corresponding sides = 12:4 = 3:1

$x = (x+10)\times\frac{1}{3}$

$3x = x + 10$

$3x - x = 10$

$2x = 10$

$x = \frac{10}{2}$

$x = 5$

5 ..... cm

**(3)**

**(Total for Question is 5 marks)**

Q2.

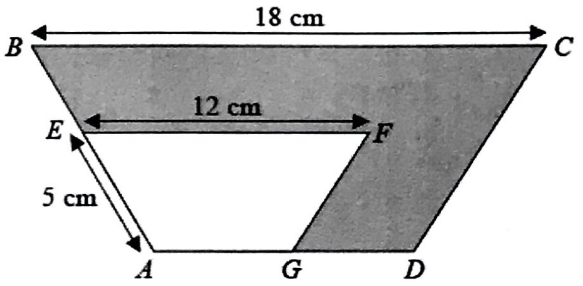



Diagram NOT accurately drawn

*ABCD* and *AEFG* are mathematically similar trapeziums.
*AE* = 5 cm
*EF* = 12 cm
*BC* = 18 cm

Ratio of corresponding sides = 18 : 12
= 3 : 2

$AB = 5 \times \frac{3}{2} = \frac{15}{2} = 7.5$

(a) Work out the length of *AB*.

7.5 ..... cm

**(2)**

Trapezium *AEFG* has an area of 36 cm$^2$.

(b) Work out the area of the shaded region.

large trapezium area
$= 36 \times \left(\frac{3}{2}\right)^2$
$= 36 \times \frac{9}{4}$
$= 81\ cm^2$

45 ..... cm$^2$

**(3)**

**(Total for Question is 5 marks)**

Shaded Region
$= 81 - 36$
$= 45\ cm^2$

Q3.

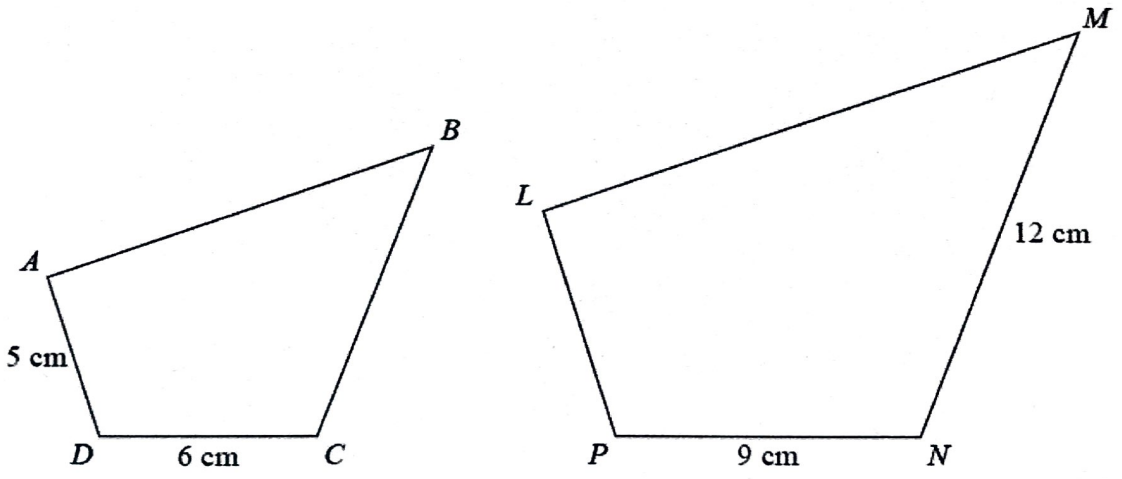



Diagram **NOT** accurately drawn

Quadrilaterals *ABCD* and *LMNP* are mathematically similar.

Ratio of corresponding sides
= 6 : 9
= 2 : 3

Angle $A$ = angle $L$
Angle $B$ = angle $M$
Angle $C$ = angle $N$
Angle $D$ = angle $P$

(a) Work out the length of $LP$.

$LP = 5 \times \frac{3}{2} = \frac{15}{2} = 7.5$

7.5 ..... cm

**(2)**

(b) Work out the length of $BC$.

$BC = 12 \times \frac{2}{3} = 8$

8 ..... cm

**(2)**

**(Total for Question is 4 marks)**

Q4.

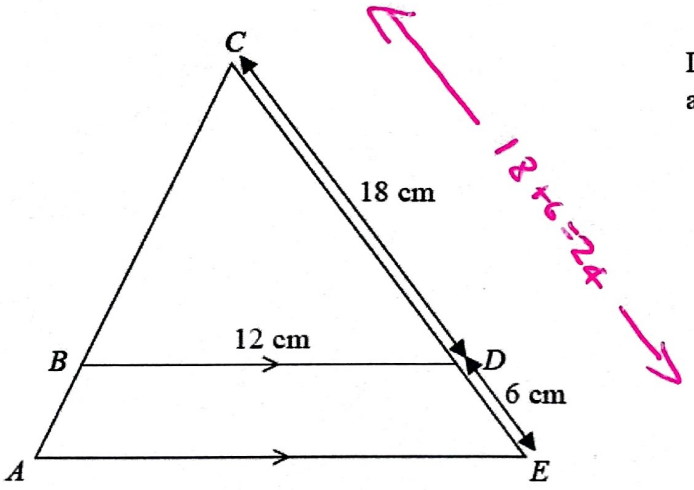



Diagram **NOT** accurately drawn

18 + 6 = 24

△s CBD similar CAE

side ratio
18 : 24
= 3 : 4

$ABC$ and $CDE$ are straight lines.
$BD$ and $AE$ are parallel.
$BD$ = 12 cm, $CD$ = 18 cm, $DE$ = 6 cm.

Work out the length of $AE$.

$AE = 12 \times \frac{4}{3} = 16$

16 ..... cm

**(Total for question = 2 marks)**

Q5.

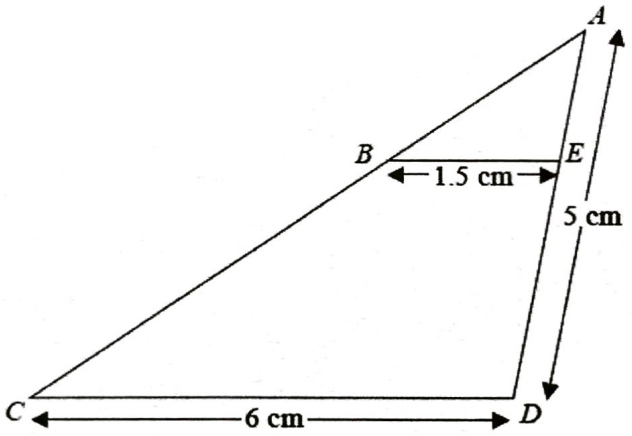



Diagram **NOT** accurately drawn

$\triangle s$ ABE, ACD similar

Side ratio 1.5 : 6 = 1 : 4

*ABC* and *AED* are straight lines.
*BE* and *CD* are parallel.
*BE* = 1.5 cm.
*CD* = 6 cm.
*AD* = 5 cm.

$AE = 5 \times \frac{1}{4} = \frac{5}{4} = 1.25$

$ED = AD - AE = 5 - 1.25$

Calculate the length of *ED*.

3.75 ..... cm

**(Total for question = 3 marks)**

Q6.

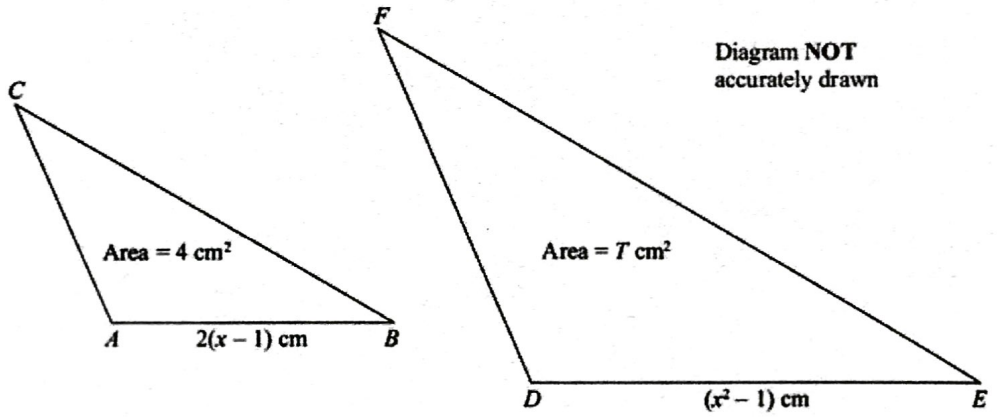



Diagram **NOT** accurately drawn

Triangles *ABC* and *DEF* are mathematically similar.

The base, *AB*, of triangle *ABC* has length $2(x - 1)$ cm
The base, *DE*, of triangle *DEF* has length $(x^2 - 1)$ cm

The area of triangle *ABC* is 4 $cm^2$
The area of triangle *DEF* is *T* $cm^2$

Prove that

$T = x^2 + 2x + 1$

$\triangle s$ ABC, DEF similar

Side ratio $2(x-1) : (x^2-1)$

$= 2(x-1) : (x+1)(x-1)$

$= 2 : (x+1)$

Area ratio $= 2^2 : (x+1)^2$

$= 4 : (x+1)^2$

Large Area T = small area $\times \frac{(x+1)^2}{4}$

$T = 4 \times \frac{(x+1)^2}{4}$

$T = (x+1)^2 = x^2 + 2x + 1$

**(Total for Question is 4 marks)**

Q7.

*ABC* is a triangle.

$\triangle s$ ADE, ABC similar

Side Ratio 4 : 10

$= 2 : 5$

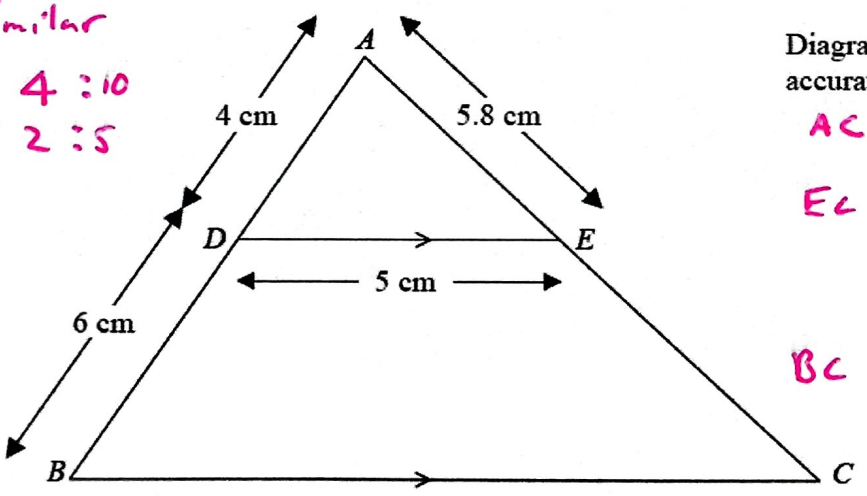



Diagram **NOT** accurately drawn

$AC = 5.8 \times \frac{5}{2} = 14.5cm$

$EC = AC - AE$

$= 14.5 - 5.8 = 8.7cm$

$BC = 5 \times \frac{5}{2} = 12.5cm$

*D* is a point on *AB* and *E* is a point on *AC*.

*DE* is parallel to *BC*.

Perimeter of trapezium

$= 6 + 5 + 8.7 + 12.5 = 32.2cm$

$AD$ = 4 cm, $DB$ = 6 cm, $DE$ = 5 cm, $AE$ = 5.8 cm.

Calculate the perimeter of the trapezium $DBCE$.

32.2 ..... cm

**(Total for Question is 4 marks)**

Q8.

Steve has a photo and a rectangular piece of card.

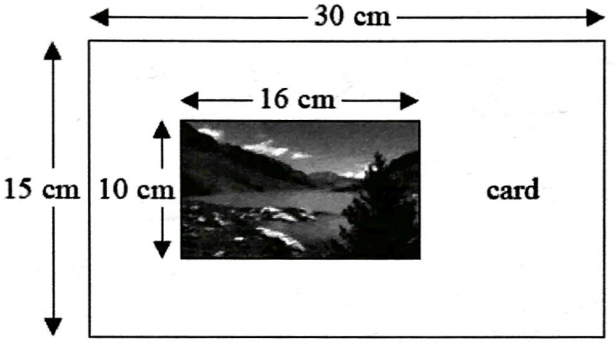
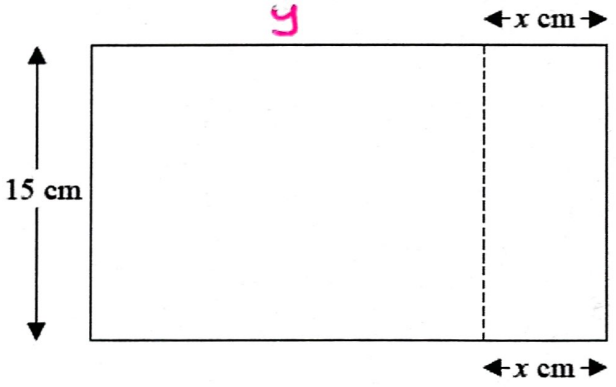



Diagram **NOT** accurately drawn

The photo is 16 cm by 10 cm.
The card is 30 cm by 15 cm.

side ratio of photo and card left over
= 10 : 15 = 2 : 3

Steve cuts the card along the dotted line shown in the diagram below.




$y = 16 \times \frac{3}{2}$

$y = 24$ cm

$x = 30 - y$

$x = 30 - 24$

Steve throws away the piece of card that is 15 cm by $x$ cm.
The piece of card he has left is mathematically similar to the photo.

Work out the value of $x$.

$x = 6$ cm

.....

**(Total for Question is 3 marks)**