AIM HIGH

CHURCHLANDS
SENIOR HIGH SCHOOL

INSTRUCTIONS:
No calculators allowed. Drawings are not to scale.
Full working must be shown for all questions (or parts) worth more than 1 mark.
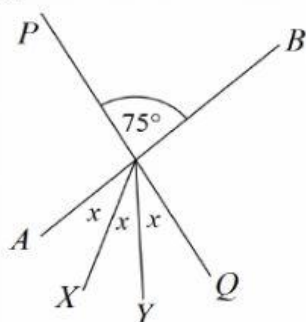Marks will be deducted for rounding and unit errors

Name:_____   **Time:50 minutes**   Total_____ / 55

QUESTION 1   State the value of the pronumerals in each of the following figures. Give reasons   **(2, 4 marks)**
for all your answers.
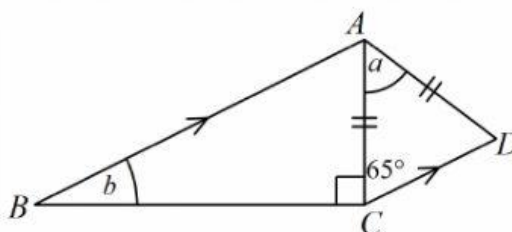
a.

$x =$ _____

reason = _____

b.

$a =$ _____

reason: _____

$b =$ _____

reason = _____

QUESTION 2   Fully factorise.   **(2, 2, 3, 2 marks)**

a. $-45g^2 + 18g$

(   )

b. $5(a - 2b) + x(a - 2b)$

(   )(   )

c. $3x^2 - 27$

(   )(   )

d. $4mn - 20mp + 12m^2$

(   )

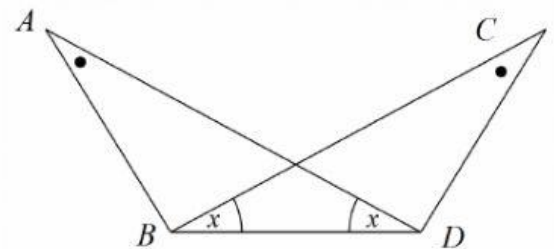**QUESTION 3** Expand and simplify.   **(2, 2, 2 marks)**
a. $(6p - 1)(3p + 4)$ b. $(7a + 2b)^2$

c. $(2 - 5z)(2 + 5z)$

QUESTION 4 Using the information on the diagram below **and the reasons**   **(3, 2 marks)**
a. Prove that $\triangle ABD \equiv \triangle CDB$

(given)
(given)
(common)

$\triangle \qquad \equiv \triangle$

$AB = 7$ cm
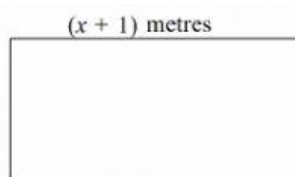$AD = 11$ cm

b. Find the length of BC and CD, giving reasons.

$BC =$

$CD =$

$reason =$

QUESTION 5 Refer to the rectangles below to answer the following: **(2, 2 marks)**
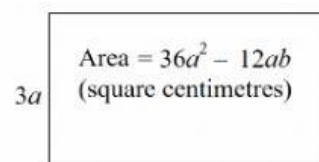a.   b.

$(x + 1)$ metres

Area $= 36a^2 - 12ab$
$3a$ (square centimetres)

Give a simplified expression for the area of the figure if its width is **5** metres less than the length as shown?
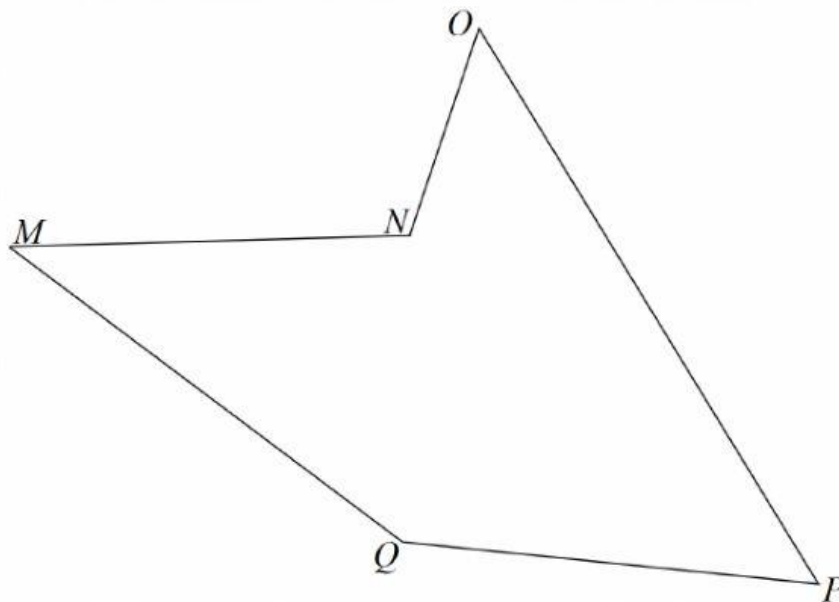
Find an expression for the missing side length given the information on the figure.

$($ $) m^2$ $($ $) cm$

O

M N

Q P

QUESTION 7 Using the diagram below (measurements in cm,) answer the following questions: **(1, 1, 3 marks)**

a. Explain how it is known that $\triangle EHI \sim \triangle EFG$.
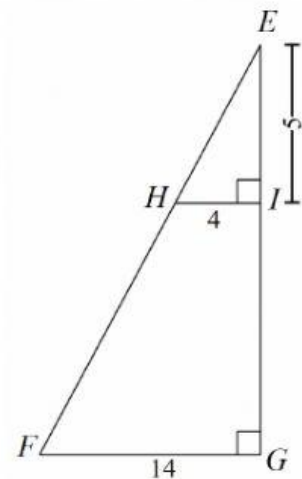
$\angle \_ \text{ is } \_\_ , \angle \quad = \angle$
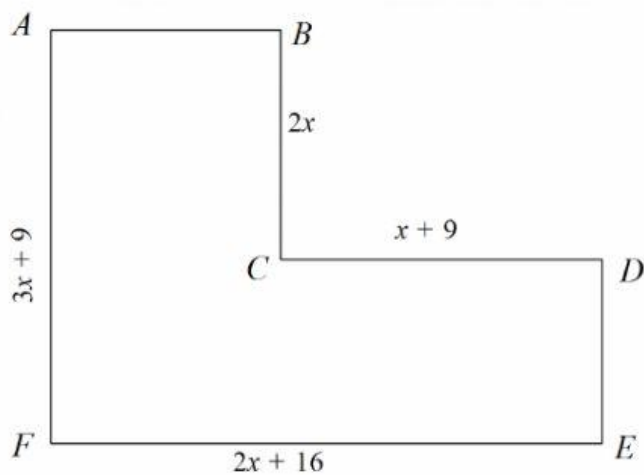
$\therefore$ triangles are similar ( )

b. What scale factor would be applied to $\triangle EHI$ to get $\triangle EFG$?

c. Determine the area of $\triangle EFG$. (Recall $\triangle\text{Area} = \frac{1}{2}bh$)

$A = \underline{\qquad}\ \text{cm}^2$

E

H I
$\quad 4$

F G
$\quad 14$

QUESTION 8   The diagram below is the design for an L-shaped swimming pool with   **(2, 1, 1, 3, 2 marks)**
dimensions in metres as shown. The pool is enlarged or reduced depending on the value of x.

A

B

$2x$

$x + 9$

$3x + 9$

C

D

F

$2x + 16$

E

a. Find, in terms of x, the length of:
   i. **AB**   ii. **DE**

b. Show that the perimeter of the pool is equal to $(10x + 50)$ metres.

c. What is the perimeter if $x = 2$?

d. Find the area of the swimming pool in terms of x. Expand and simplify your answer.

e. It is decided that a square swimming pool would be a better use of space. By factorising your answer to part d, find the dimensions, in terms of x, of a square swimming pool with the same area as the L-shaped pool.

(   )m × (   )m

QUESTION 9   Using the information in the figure below: **(3, 1, 1 marks)**

a.   Prove that $\triangle ABM$ is similar to $\triangle CDM$

$\angle \quad = \quad \angle$ _____ (given)

___ $=$ ___ _____ (given)
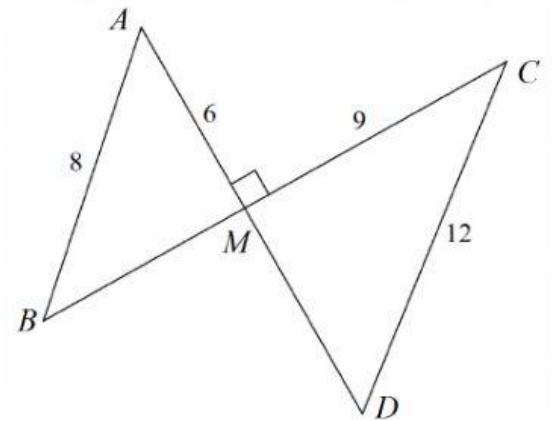
$\triangle \quad ||| \quad \triangle$ _____ (   )

b.   Hence prove that $\angle B = \angle D$.

c.   Is it true that $AB \parallel CD$?
You must state your answer and give a reason why/why not.
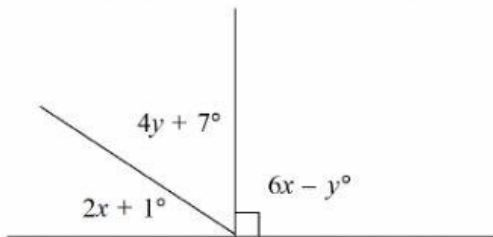
answer =

reason =

QUESTION 10   Find the value of the pronumerals in the figure below: **(3 marks)**

$4y + 7°$

$2x + 1°$

$6x - y°$

$x =$

$y =$