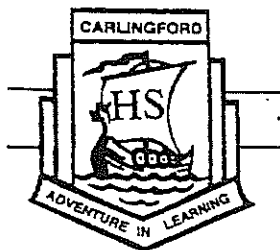


# Carlingford High School



## Mathematics

### Year 9 Term 3 Examination

### 5.2 Course

### 2018

Name: SOLUTIONS Class: \_\_\_\_\_

Circle your teacher's name: Mrs Lobejko Mrs Lego Ms Aung Mr Wilson  
*Time allowed: 50 minutes*

- Board approved calculators may be used.
- Show all necessary working.
- Marks may be deducted for careless or untidy work.
- Complete the examination in blue or black pen.

GEOMETRY	TRIGONOMETRY	TOTAL	
/40	/22	/62	%

## GEOMETRY (36 marks)

1. Write TRUE or FALSE [6marks]

(a) A heptagon has six sides. F

(b) Alternate angles are always equal F

(c) Adjacent angles always have a common arm T

(d) Bisect means to cut into two unequal parts F

(e) A regular polygon must have at least three equal sides T

(f) A transversal is a line that intersects with another line F

2. From the list of quadrilaterals provided list the quadrilateral(s) that have the following properties: [6marks]

trapezium	square	kite
parallelogram	rhombus	rectangle

(a) All sides equal

square, rhombus

(b) Equal diagonals

rectangle, square

(c) Both pairs of opposite sides parallel

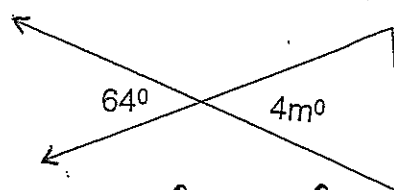
parallelogram, rectangle, square, rhombus

(d) Perpendicular diagonals

rhombus, kite, square

3. Find the value of the pronumeral, writing reasons. [9marks]

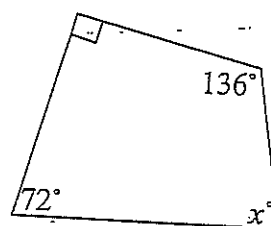
② (a)



$4m^\circ = 64^\circ$   
(vertically opposite angles)

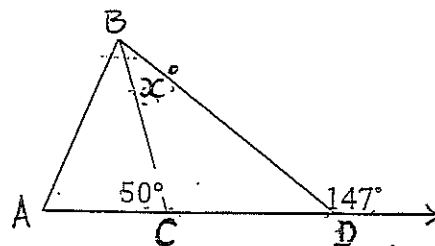
$$\therefore m = 16$$

② (b)



$x + 72^\circ + 136^\circ + 90^\circ = 360^\circ$   
(angle sum of a quadrilateral)  
 $x = 62^\circ$

② (c)

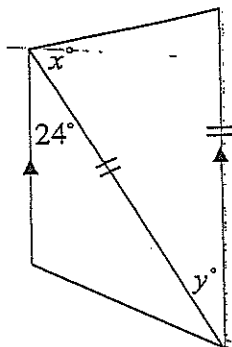


$\angle BCD = 130^\circ$  (angles in a straight angle)

$x + 130^\circ = 147^\circ$  (exterior angle of a triangle)  
 $\therefore x = 17^\circ$

3

(d)



$y^\circ = 24^\circ$   
(alternate angles on parallel lines)

$x^\circ + x^\circ + 24^\circ = 180^\circ$   
(angle sum of an isosceles triangle)

$$2x^\circ = 156^\circ$$

$$x^\circ = 78^\circ$$

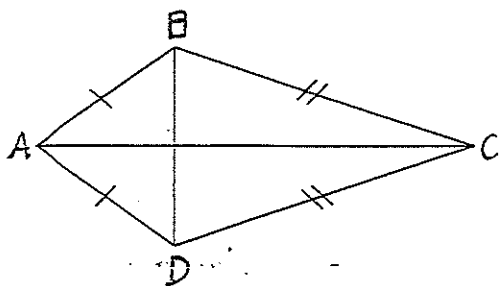
4. List the four tests for Congruent Triangles.  
[2marks]

RHS, SSS, AAS, SAS

5. State which test determines that

$\triangle ABC \equiv \triangle ADC$  and write the reason.

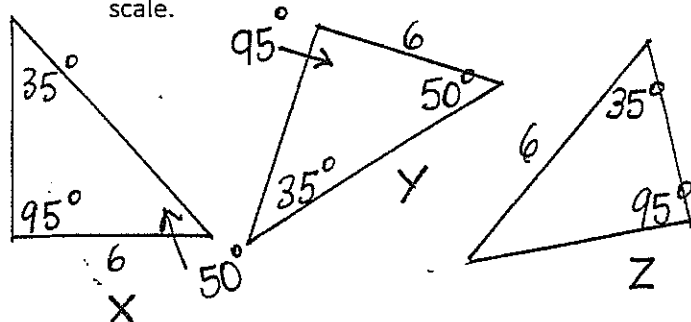
[2marks]



SSS test

AC is a common side

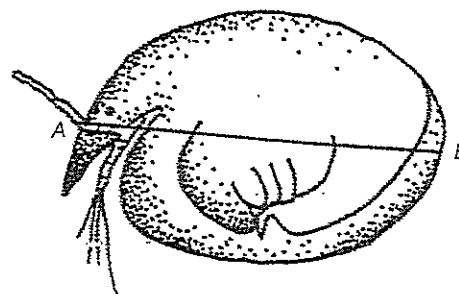
6. The three triangles below are not drawn to scale.



Which two triangles are congruent and by what test?  
[1mark]

X and Y are congruent  
AAS test

7. The tiny animal illustrated below, called a *chydorus*, lives in fresh-water ponds.



SCALE 160:1

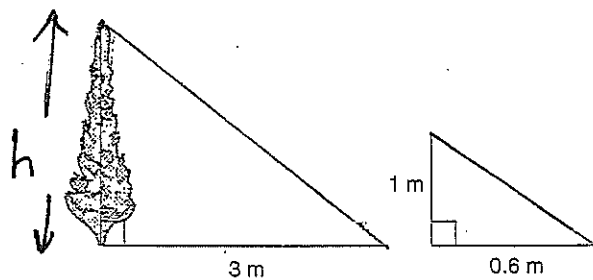
In the diagram, AB is 48mm long.

What is the actual length of the *chydorus*?

[1mark]

$$48 \text{ mm} \div 160 = 0.3 \text{ mm}$$

8. A tree casts a shadow 3 metres in length. At the same time a metre ruler casts a shadow 0.6 metres long.  
[2marks]



- (a) Find the height of the tree.

$$\frac{h}{1} = \frac{3}{0.6}$$

$$\therefore h = 5 \text{ m}$$

- (b) Circle the correct test for the Similar Triangles above:

■ Three pairs of matching angles equal.

■ Three pairs of matching sides in proportion.

■ Two pairs of matching sides in proportion and included angles equal.

9. The scale on a map is given as  $1 \text{ cm} = 3 \text{ km}$ . If the distance between two points on the map is  $2.7 \text{ cm}$ , find the actual distance between these two points.  
[1mark]

$$1 \text{ cm} : 3 \text{ km}$$

$$2.7 \text{ cm} : (3 \times 2.7) \text{ km}$$

$$8.1 \text{ km}$$

10. By measurement, find the scale of the drawing.  
[2marks]



1 : 200

Drawing : Real

$$2.7 \text{ cm} : 5.4 \text{ m}$$

$$2.7 \text{ cm} : 540 \text{ cm}$$

$$1 : 200$$

OR

$$1.1 \text{ cm} : 2.2 \text{ m}$$

$$1.1 \text{ cm} : 220 \text{ cm}$$

$$1 : 200$$

11. [4marks]

- (a) Find the sum of the interior angles of a regular octagon.

$$S = (n-2) \times 180^\circ$$

$$= (8-2) \times 180^\circ$$

$$= 6 \times 180^\circ$$

$$= 1080^\circ$$

- (b) What is the size of one interior angle?

$$1080^\circ \div 8 = 135^\circ$$

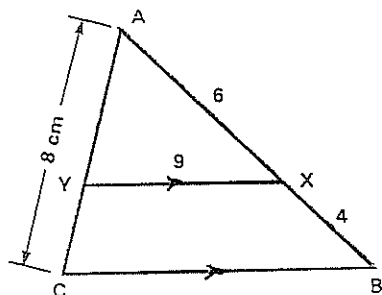
- (c) What is the sum of the exterior angles of regular octagon?

$$360^\circ$$

12. Given that  $\triangle AYX$  is similar to  $\triangle ACB$ ,

[4marks]

EXTRA WORKING SPACE



- ① (a) Name the matching side to  $YX$

$CB$

- ① (b) Name the matching angle to  $\angle AYX$

$\angle ACB$  OR  $\angle YCB$

- ② (c) Find the length of  $AY$

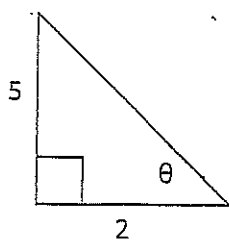
$$\frac{AY}{8} = \frac{6}{6+4}$$

$$\begin{aligned} \therefore AY &= \frac{6}{10} \times 8 \\ &= 4.8 \text{ cm} \end{aligned}$$

## TRIGONOMETRY (22 marks)

1. Given the triangle below, find the:

[3marks]



- (a) length of the hypotenuse

$$\begin{aligned} h^2 &= 5^2 + 2^2 \\ &= 25 + 4 \\ &= 29 \end{aligned}$$

$$\therefore h = \sqrt{29}$$

- (b) Value of  $\tan \theta$

$$\tan \theta = \frac{5}{2}$$

- (c) Value of  $\sin \theta$

$$\sin \theta = \frac{5}{\sqrt{29}}$$

2. Calculate correct to three decimal places.

[2marks]

(a)  $\tan 72^\circ = 3.078$

(b)  $\sin 42.5^\circ = 0.676$

3. Find the angle  $\theta$  to the nearest degree.

[2marks]

(a)  $\cos \theta = 0.6574$

$$\theta = 49^\circ$$

(b)  $\tan \theta = 10.34$

$$\theta = 84^\circ$$

4. Find  $x$  given that  $\sin 30^\circ = \cos x^\circ$  [1mark]

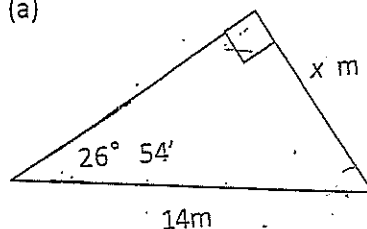
$$x = 90^\circ - 30^\circ$$

$$x = 60^\circ$$

5. Find the value of the pronumeral in each triangle, correct to one decimal place.

[4marks]

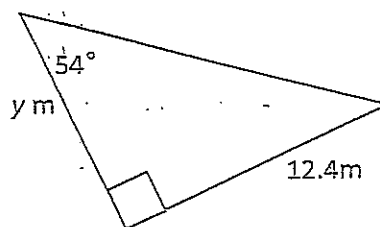
(a)



$$\sin 26^\circ 54' = \frac{x}{14}$$

$$\begin{aligned} \therefore x &= 14 \times \sin 26^\circ 54' \\ &= 6.334... \\ &\div 6.3 \text{ m} \end{aligned}$$

(b)

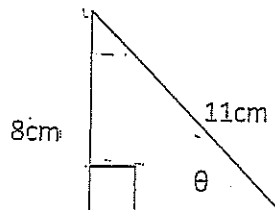


$$\tan 54^\circ = \frac{12.4}{y}$$

$$\begin{aligned} \therefore y &= \frac{12.4}{\tan 54^\circ} = 9.009... \\ &= 9.0 \text{ m} \end{aligned}$$

6. Find the size of  $\theta$  to the nearest degree.

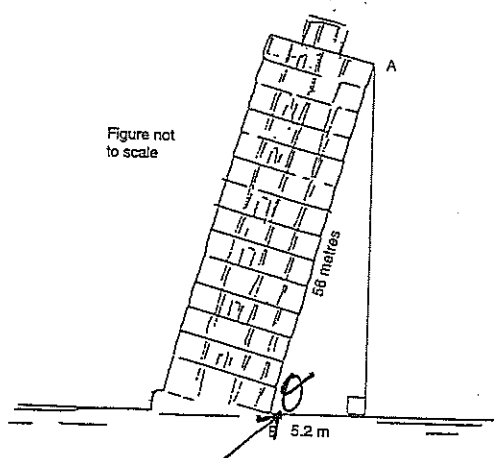
[2marks]



$$\sin \theta = \frac{8}{11}$$

$$\begin{aligned} \therefore \theta &= \sin^{-1}(8 \div 11) \\ &= 46.658... \\ &= 47^\circ \end{aligned}$$

7. Calculate the angle the tower makes with the ground, giving your answer in degrees and minutes. [2marks]



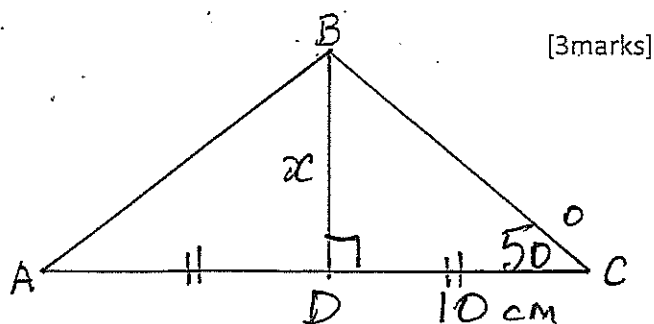
$$\cos \theta = \frac{5.2}{56}$$

$$\therefore \theta = \cos^{-1}(5.2 \div 56)$$

$$= 84^{\circ} 40'$$

8. Given the triangle  $ABC$ , mark a point  $D$  on  $AC$  such that  $BD$  is perpendicular bisector to  $AC$ .

If  $AC$  is  $20\text{cm}$  and  $\angle C = 50^{\circ}$ , find the length of  $BD$  to the nearest whole number.



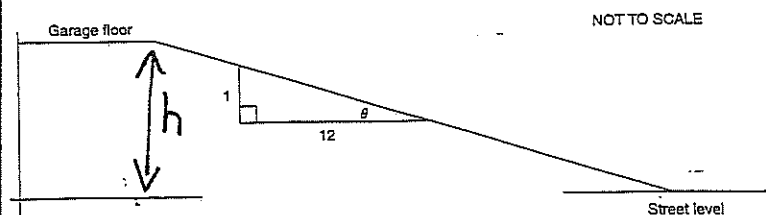
$$\tan 50^{\circ} = \frac{x}{10}$$

$$x = 10 \times \tan 50^{\circ}$$

$$= 11.917 \dots$$

$$\approx 12 \text{ cm}$$

9. A driveway has a gradient of 1 in 12 as shown in the diagram below. [3marks]



- (a) Calculate the angle of inclination  $\theta$  of the driveway, to the nearest degree.

$$\tan \theta = \frac{1}{12}$$

$$\therefore \theta = \tan^{-1}(1 \div 12)$$

$$= 4.763 \dots$$

$$\approx 5^{\circ}$$

- (b) If the driveway is  $22\text{m}$  long, calculate the height of the garage floor above street level. (1 dp)

$$\sin 5^{\circ} = \frac{h}{22}$$

$$\therefore h = \sin 5^{\circ} \times 22$$

$$= 1.9174 \dots$$

$$\approx 1.9 \text{ m}$$

THE END