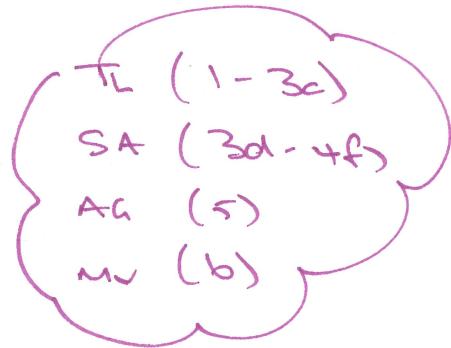


Carlingford High School



Mathematics Year 9 5.2 Term 3 Exam 2019

Name: _____ *SOLUTIONS*

Please circle your class:

9MA2_1 (Miss Aung) 9MA2_X (Mrs Lobejko) 9MA2_Y (Mr Gong)

9MA2_4 (Mrs Virmani/Mr Fardouly)

Time allowed: 50 minutes

- Show all necessary working
- Answer all questions in the spaces provided
- Marks may be deducted for careless or untidy work
- Complete the examination in blue or black pen

Topic	Geometry	Congruent and Similar Figures	Trigonometry	Mark	
Mark	/22	/28	/20	/70	%

Geometry (22 marks)

Question 1. For each of the following diagrams, write the matching reason from the Geometry Reference sheet.

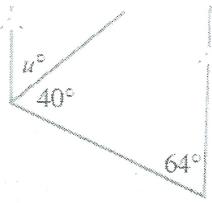
[3 marks]

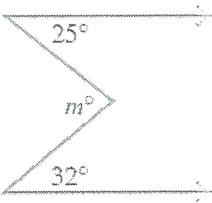
	Question	Reason
(a)		Angles in a right-angle ✓
(b)		Angles at a point ✓
(c)		Cointerior angles in parallel lines. ✓

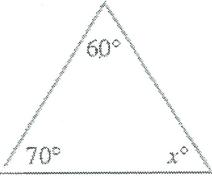
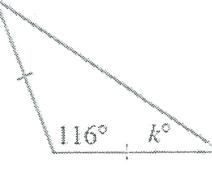
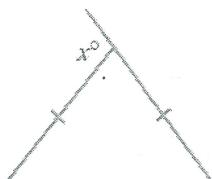
Question 2. Find the value of each pronumeral. (Working is required for two mark questions)

[9 marks]

	Question	Working and Answer
(a)		$k = 180 - 150$ $k = 30$ ✓
(b)		$4k = 360 - 64$ } ✓ $4k = 296$ } $k = 74$ ✓
(c)		$3w + 16 = 97$ } ✓ $3w = 81$ } $w = 27$ ✓

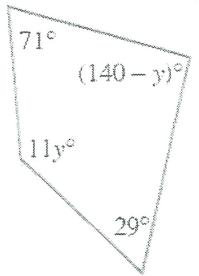
(d)		$u + 40 + 64 = 180$ $u = 180 - 40 - 64$ $u = 76$
[2 marks]		

(e)		$m = 25 + 32$ $m = 57$ <p>(Working may be shown on diagram)</p>
[2 marks]		

Question 3. Find the value of each pronumeral.		[10 marks]
	Question	Working, answer and reasons
(a)		$x = 180 - 60 - 70$ $x = 50$ <p>Reason: Angle sum of a triangle ✓</p>
[2 marks]		
(b)		$k + k + 116 = 180$ $2k = 180 - 116$ $2k = 64$ $k = 32$ <p>Reason: Angle sum of an isosceles triangle ✓</p>
[2 marks]		
(c)		$x = \frac{360}{n}$ $= \frac{360}{3} = 120^\circ$ <p>Reason: Exterior angle of a regular polygon ✓</p>
[2 marks]		

(or Angle in an equilateral triangle not on ref sheet.
and Angles in a straight-angle)

(d)

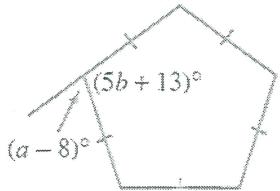


[2 marks]

$$\begin{aligned} 71 + 11y + 140 - y + 29 &= 360 \\ 10y &= 120 \\ y &= 12 \end{aligned}$$

Reason: Angle sum of a quadrilateral ✓

(e)



(no reasons required)

[2 marks]

The interior angle of a regular pentagon is 108° .Find the value of a and b .

$$5b + 13 = 108$$

$$5b = 95$$

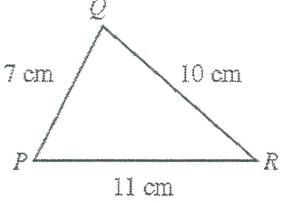
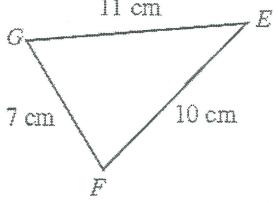
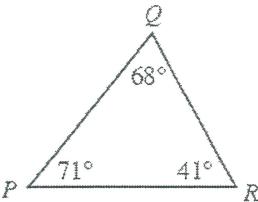
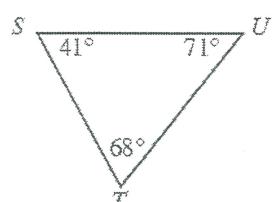
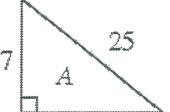
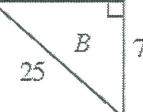
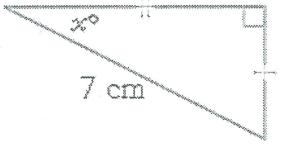
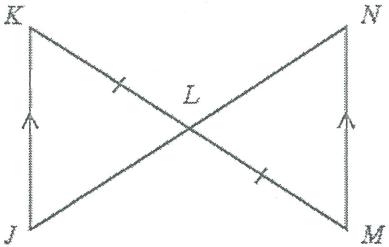
$$b = 19 \quad \checkmark$$

$$a - 8 = 150 - 108$$

$$a = 72 + 8$$

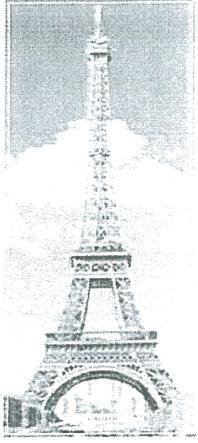
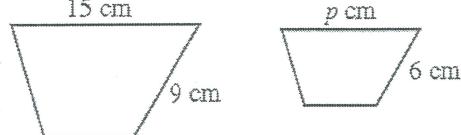
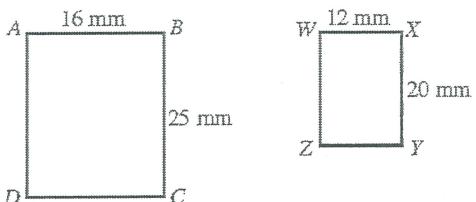
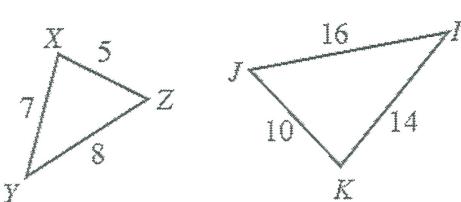
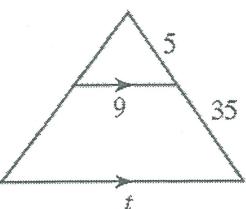
$$a = 80 \quad \checkmark$$

Congruent and Similar Figures (28 marks)

Question 4.		[13 marks]
	Question	Answer
(a)	 	Complete this congruence statement. (Use the correct order) $\Delta PQR \equiv \Delta \underline{GFE}$ ✓
(b)	 	Explain why these triangles are not congruent. <i>Matching angles equal is not a congruence test.</i> ✓
(c)	  	(i) Which pair of triangles are congruent? <u>A</u> and <u>B</u> ✓ (ii) State the congruence test. <u>(RHS)</u> ✓ [2 marks]
(d)	 	(i) State the congruence test. <u>(SAS)</u> ✓ (ii) $p =$ <u>7</u> ✓ (iii) $x =$ <u>$90 - 62 = 28$</u> ✓ [3 marks]
(e)		Complete the congruence proof. In ΔJKL and ΔNML $KL = ML$ $\angle JKL = \angle \underline{NML}$ ✓ $\angle KLJ = \angle MLN$ (Reason: <u>Vertically opposite angles</u>) ✓ $\therefore \Delta JKL \equiv \Delta NML$ (<u>AAS</u>) ✓ [3 marks]

<p>(f)</p> <p>[3 marks]</p>	<p>This pair of triangles pass the SSS congruence test.</p> <p>(i) Hence, give a reason why $\angle EFG = \angle EHG$.</p> <p><u>Matching angles in congruent triangles</u></p> <p>(ii) Complete the sentence:</p> <p>This proves that a <u>kite</u> has one pair of <u>opposite</u> angles equal.</p>
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Question 5.		[15 marks]
	Question	Answer
<p>(a)</p> <p>35 m</p> <p>50 m</p> <p>$\frac{5000}{1000} = 5\text{cm}$</p> <p>$\frac{3500}{1000} = 3.5\text{cm}$</p> <p>[3 marks]</p> <p>not required.</p>	<p>The measurements of a rectangular cattle yard are given in the diagram. (Not drawn to scale)</p> <p>(i) Make a scale drawing of the yard using a scale of 1:1000.</p> <p>(ii) What would be the area of the scale drawing if a scale of 1:750 is used instead?</p> $\frac{5000}{750} \times \frac{3500}{750} = 31\frac{1}{9}\text{cm}^2$ <p style="text-align: right;"><i>CFE available..</i></p>	

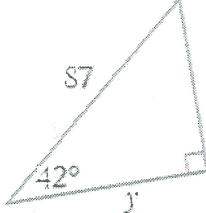
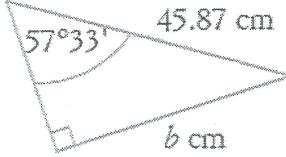
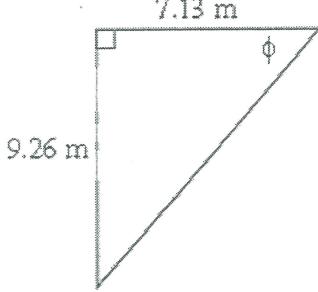
(b)	 [2 marks]	<p>The Eiffel Tower in France is 324m high, with a square base measuring 125m on each side.</p> <p>A scale model of the tower is 30cm tall.</p> <p>Calculate the length of each of the scale model's base sides. (Write your answers in centimetres, correct to 1 decimal place)</p> <p><u>$\frac{32400}{30} = 1080$</u> /</p> <p><u>$\frac{12500}{1080} = 11.\overline{6}$</u> cm. <i>(Correct rounding not required.)</i></p>
(c)	 [3 marks]	<p>These figures are similar.</p> <p>(i) Scale factor = <u>$\frac{6}{9} = \frac{2}{3}$</u> <i>(Do not accept $1.\overline{3}$ or 1.5.)</i></p> <p>(ii) Find the value of p.</p> <p>$P = 15 \times \frac{2}{3}$ $= 10$ /</p> <p>(iii) Reason: <u>Matching sides in similar triangles in equal ratio.</u> /</p>
(d)	 [2 marks]	<p>Show all calculations to prove that these rectangles are not similar.</p> <p><u>$\frac{12}{16} = \frac{3}{4}$</u>, <u>$\frac{20}{25} = \frac{4}{5}$</u> <i>(Do not accept $1.\overline{3}$ and $1.\overline{2}$.)</i></p> <p><u>$\frac{3}{4} \neq \frac{4}{5}$</u> \therefore <u>not similar</u> /</p>
(e)	 [2 marks]	<p>(i) Write the test that proves that these triangles are similar.</p> <p><u>Matching sides in equal ratio</u> / <i>(Do not accept "in similar triangles")</i></p> <p>(ii) Complete: $\Delta XYZ \sim \Delta KIJ$ / <i>(Must have both)</i></p>
(f)		<p>(i) Write the test that proves that these triangles are similar.</p> <p><u>Two pairs of matching angles equal</u> /</p>

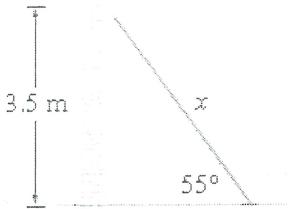
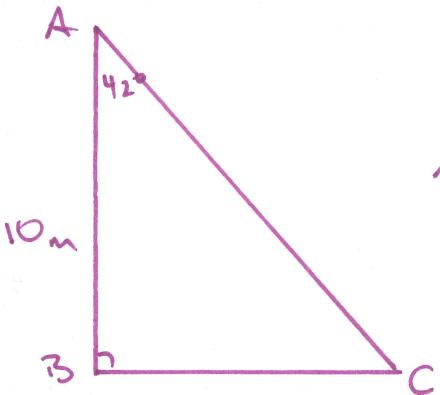
[3 marks]

(ii) Find the value of t .

$$\begin{aligned} \frac{4}{5} &= 8 \\ t &= 9 \times 8 \\ &= 72 \end{aligned}$$

Trigonometry (20 marks)

Question 6.		[20 marks]
	Question	Answer
(a)	Evaluate each expression, correct to 4 decimal places (where appropriate). [3 marks]	(i) $25\cos 12^\circ = 24.4537$ ✓ <i>Frounding must be correct.</i> (ii) $\frac{9.2}{\sin 30^\circ} = 18.4$ ✓ (iii) $\tan 20^\circ 35' = 0.3755$ ✓
(b)	Round each angle, correct to the nearest minute. [2 marks]	(i) $68^\circ 14' 35'' \approx 68^\circ 15'$ ✓ (ii) $25.5372^\circ \approx 25^\circ 32'$ ✓
(c)	 [4 marks]	(i) How long is the side adjacent to θ ? 7 ✓ (ii) Write $\tan \theta$ as a fraction. $\frac{24}{7}$ ✓ (iii) Find the value of θ , correct to the nearest degree. $\theta = \tan^{-1} \frac{24}{7} = 74^\circ$ ✓ <i>(-1 mark for incorrect rounding).</i>
(d)	 [2 marks]	Calculate the value of y , correct to the nearest whole number. $\cos 42^\circ = \frac{y}{87}$ ✓ $y = 87 \cos 42^\circ$ $y = 65$ ✓
(e)	 [2 marks]	Calculate the value of b , correct to one decimal place. $\sin 57^\circ 33' = \frac{b}{45.87}$ ✓ $b = 45.87 \sin 57^\circ 33'$ $b = 38.7$ ✓
(f)	 [2 marks]	Find the value of ϕ , correct to the nearest minute. $\tan \phi = \frac{9.26}{7.13}$ ✓ $\phi = 52^\circ 24'$ ✓ <i>(-1 mark for incorrect rounding)</i>

(g)	 <p>[2 marks]</p>	<p>A ladder leaning against a vertical wall reaches 3.5m up the wall and makes an angle of 55° with the ground.</p> <p>Complete the working to find the length of the ladder, correct to 1 decimal place.</p> $\sin 55^\circ = \frac{3.5}{x}$ $x = \underline{\hspace{2cm}} \quad \text{3.5} / \sin 55^\circ /$ $= \underline{\hspace{2cm}} \quad 4.3 \text{m} /$ <p><u>No marks for $3.5 \sin 55 = 2.9$</u></p>
(h)	<p>In $\triangle ABC$, $\angle A = 42^\circ$, $\angle B = 90^\circ$ and $AB = 10\text{m}$.</p> <p>[3 marks]</p>	<p>(i) Draw and label this triangle. (You do not need to use a protractor)</p>  <p>(ii) Find the length of AC, correct to the nearest centimetre.</p> $\cos 42^\circ = \frac{10}{AC} /$ $AC = \frac{10}{\cos 42^\circ}$ $= \underline{\hspace{2cm}} \quad 13.46 \text{m} /$

*(No marks deducted for
END OF TEST! incorrect rounding)*