**GRADE 9 MATHEMATICS**

**TERM 2**

**FORMAL ASSESSMENT TASK INVESTIGATION: Congruency & Similarity**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Class: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

School: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Teacher:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Total: 80 Marks Time: 1½ hour**

**Instructions:**

1. Write your name and surname in the spaces above.
2. All questions must be answered on the question paper.
3. Show all calculations.
4. You may use an approved calculator.
5. You must do your own work.
6. Check your answers.
7. Show the units of measurement where applicable.
8. All answers must be rounded to one decimal place unless stated otherwise.

**Section A: INVESTIGATION [50]**

* Congruent shapes are shapes which are the same in all cases.
* Corresponding sides are equal and angles are equal.
* The shapes of the figures are identical

To determine whether figures are congruent, all sides and angles must be measured and compared.

The same would apply for congruent triangles. However, there are some cases where it is not necessary to have all three sides and all three angles to prove that the triangles are congruent.

 We are now going, by accurate constructions, try to find out what is the minimum information needed to have congruent triangles. Each time use only the information provided. You will now determine what sets of measurements will give only one possible triangle. Use a ruler, compass and protractor to construct the following triangles.

**Question 1:** Minimum dimensions are given each time:

1.1 If three sides are given: side, side, side (S,S,S): (4)

ΔDEF with DE = 7 cm, DF = 6 cm and EF = 5 cm.

1.2 If three angels are given: angel, angle, angle ($∠,∠,∠)$: (4)

ΔABC with $\hat{A}$ = 80°, $\hat{B}$ = 60° and $\hat{C}$ = 40°.

1.3 If one side and two angles are given: side, angle, angle (S, $∠,∠)$: (4)

ΔGHI with GH = 8 cm, $\hat{G}$ = 60° and $\hat{H}$ = 30°.

1.4 If two sides and an including angle are given: side, angle, side (S,$∠,$S): (4)

ΔJKL with JK = 9 cm, $\hat{K}$ = 130° and KL = 7 cm.

1.5 If two sides and an angle which are not included are given: side, side, and angle

(S, S,$ ∠)$: ΔMNP with MN = 10 cm, $\hat{M}$ = 50° and PN = 8 cm. (4)

1.6 If a right angle, the hypotenuse and another side is given: (90°, hypotenuse, S):

ΔTRS with TR ⊥ RS, RS = 7 cm and TS = 8 cm. (4)

 (24)

1.7 Compare your triangles with the triangles of three of your class mates. Which of your triangles are:

1.7.1 congruent to theirs?

------------------------------------------------------------------------------------ (2)

1.7.2 not congruent?

------------------------------------------------------------------------------------ (2)

**[28]**

 **Question 2. Complete the table below. Write down if congruent triangles can be constructed if the following conditions are given:**

|  |  |
| --- | --- |
| **Conditions** | **Congruent (Yes/ No)** |
| 3 sides (SSS)  |  |
| 2 sides (SS)  |  |
| 3 angles ($∠, ∠, ∠)$ |  |
| 2 angles and a side ($∠, ∠, $S) |  |
| 2 sides and a triangle that is not situated between the sides (S, S, $∠$) |  |
| 2 sides and an angle that is situated between the two sides (S, $∠,$ S) |  |
| A right angle with a hypotenuse and another side (90°HS) or (90$°$, hypotenuse, side ) |  |

 (7)

 **[7]**

**Question 3. Similar triangles**

PROPERTIES OF SIMILAR TRIANGLES

ΔBAC and ΔDEF are similar to each other. Similar shapes have the same shape but their sizes may be different.



3.1 Use a protractor to measure the angles in both the above triangles. Complete the table below:

|  |  |  |
| --- | --- | --- |
| **ANGLE** | **ANGLE** | **What do you observe?** |
| $\hat{B} $= | $\hat{D} $= |  |
| $$\hat{A}=$$ | $$\hat{E}=$$ |  |
| $$\hat{C}= $$ | $$\hat{F}= $$ |  |

 (6)

3.2 What can you say about the size of the angles of similar triangles?

 --------------------------------------------------------------------------------------------------------- (1)

3.3 Use a ruler to measure the sides in each of the given triangles above (question 3.1). Complete the table below:

|  |  |  |
| --- | --- | --- |
| **Length in cm** | **Length in cm** | **Ratio***Ratio reminder: you read 2:1 as “two to one”* |
| $BA $= | $DE $= | $BA:DE $= |
| $$BC=$$ | $$DF=$$ | $BC:DF $= |
| $$CA= $$ | $$FE= $$ | $CA:FE $= |

 (6)

3.4 What can you say about the relationship between the sides of similar triangles?

 ----------------------------------------------------------------------------------------------------------

 --------------------------------------------------------------------------------------------------------- (1)

3.5 The following notations show that two triangles are similar: ΔBAC /// ΔDEF.

Why do you think we write the first triangle as ΔBAC and not as ΔABC?

-----------------------------------------------------------------------------------------------------------

-----------------------------------------------------------------------------------------------------------

--------------------------------------------------------------------------------------------------------- (1)

**[15]**

**Section B: ASSIGNMENT [30]**

1. Name the 4 cases of congruence in triangles:

-------------------------------------------------------------------------------------------------- **[4]**

1. Complete: If 2 triangles have equal angles, we may say that the two triangles are:

-------------------------------------------------------------------------------------------------- **[1]**

1. Write down in words the meaning of:

3.1 $∆ABC≡∆XYZ$

--------------------------------------------------------------------------------------------------- (2)

3.2 $∆ABC///∆XYZ$

--------------------------------------------------------------------------------------------------- (2)

3.3 $RM∥EH$

--------------------------------------------------------------------------------------------------- (2)

**[6]**

1. In the diagram below the following dimensions are given:

 $∠$B = $∠$E = 90$°$, $∠$C1 = $∠$F1 and AB = ED.

**A**

**B**

**F**

**E**

**D**

**C**

1

2

1

2

4.1 Prove: $∆$ ABC $≡$ $∆$ DEF.

|  |  |
| --- | --- |
|  Statement | Reason |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

(5)

4.2 Prove that AF = CD.

|  |  |
| --- | --- |
|  Statement | Reason |
|  |  |
|  |  |
|  |  |
|  |  |

 (3)

**[8]**

In the diagram below $∠QPR$ = 90$°$ and $PT⊥QR$.

1

**T**

**P**

**Q**

**R**

1

2

2

5.1 Prove that $∆$ PQT||| $∆$RQP.

|  |  |
| --- | --- |
|  Statement | Reason |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

 (5)

5.2 Calculate the length of PQ if QT = 4cm and TR = 12cm.

|  |  |
| --- | --- |
|  Statement | Reason |
|  |  |
|  |  |
|  |  |
|  |  |

 (6)

 **[11]**

**TOTAL: 80**

**(Investigation: 50 + Assignment: 30)**