TASK DETAILS

Task Name: Ratio, proportion and similar figures

Grade: 10

Subject: Mathematics

Task Description: This sequence of tasks asks students to demonstrate and effectively communicate their mathematical understanding of ratios and proportional relationships, with a focus on expressions and equations.

Their strategies and executions should meet the content, thinking processes and qualitative demands of the task.

Common core standards (Content)

[CCSS.Math.Content.HSG.SRT.A.1](http://www.corestandards.org/Math/Content/HSG/SRT/A/1/)  
Verify experimentally the properties of dilations given by a center and a scale factor:

[CCSS.Math.Content.HSG.SRT.A.1.a](http://www.corestandards.org/Math/Content/HSG/SRT/A/1/a/)  
A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.

[CCSS.Math.Content.HSG.SRT.A.1.b](http://www.corestandards.org/Math/Content/HSG/SRT/A/1/b/)  
The dilation of a line segment is longer or shorter in the ratio given by the scale factor.

[CCSS.Math.Content.HSG.SRT.A.2](http://www.corestandards.org/Math/Content/HSG/SRT/A/2/)  
Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.

**Standards for Mathematical Practice:**

**MP.1** Make sense of problems and persevere in solving them.

**MP.2** Reason abstractly and quantitatively.

**MP.3** Construct viable arguments and critique the reasoning of others.

**MP.4** Model with mathematics.

**MP.6** Attend to precision.

**BIG IDEAS/ENDURING UNDERSTANDINGS:**

 Patterns and relationships can be represented graphically, numerically, and symbolically.

. Several ways of reasoning, all grounded in sense making, can be generalized into algorithms for solving proportion problems.

**ESSENTIAL QUESTIONS:**

. How can ratio, proportions and similar figures can be used as tools to best describe and help explain real-life relationships?

How can the same mathematical idea be represented in a different way? Why would that be useful?

Performance task

Ratio, proportion and similar figures

Use the diagrams below to remind you of markings and their meanings:

These lines are parallel These lengths are congruent These angles are congruent

1. In this diagram two 70° angles have beenA B

o

labeled. Four other angles are labeled *w*, *x*, *y*

and *z*.

Complete the table below. If it is possible to work out the measure of the angle, write it down and show your method. If it is not possible, explain how you know.

70 *w*

*z*

*y*

*x* 70o

D

NOT TO SCALE

C

|  |  |  |
| --- | --- | --- |
| Angle | Is it possible to find the measure of the angle? If so, what is it? | Explain carefully how you decided. |
| *w* |  |  |
| *x* |  |  |
| *y* |  |  |
| *z* |  |  |

1. The diagram below shows two triangles, triangle ABC and triangle ACD:

A B

110o

70o

NOT TO SCALE

65o

D C

Are the two triangles similar? Explain, step by step, how you know.

1. The diagram below shows triangle BCD within triangle ACE.

A

TO SCALE

NOT

B

65o

65o

E D C

Are the two triangles similar? Explain, step by step, how you know.

Sorting Triangles

**A**

Are triangles *PQR* and *SPR* similar?

*P*

*Q*

70o

NOT TO SCALE

55o

*S*

*R*

**B**

Are triangles *PQS* and *QRS* similar?

*P*

*Q*

NOT TO SCALE

70o

*S*

*R*

**C**

*P*

Are triangles *PQR* and *STU* similar?

*Q*

*R*

*S*

NOT TO SCALE

*U*

70o

*T*

**D**

*P*

Are triangles *PQR* and *STR* similar?

*Q*

70o

NOT TO SCALE

*S*

*T*

*R*

**E**

Are triangles *PQR* and *STR* similar?

*P Q*

*S*

NOT TO SCALE

*R*

*T*

**D**

Are triangles *PQR* and *TRS* similar?

*P*

*Q*

NOT TO SCALE

*T*

110o

*R*

*S*

**G**

Are triangles *PRS* and *QRS* similar?

*P*

*Q*

70o

*T*

NOT TO SCALE

70o

*S*

*R*

**H**

Are triangles *PQR* and *RST* similar?

*P*

*Q*

*R*

NOT TO SCALE

*T*

*S*

**My example**

**My example**

**Triangles Task**

The data shown in the graph below reflects average wages earned by machinists across the nation.



1. What hourly rate is indicated by the graph? Explain how you determined your answer.
2. What is the ratio of the height to the base of the small, medium and large triangles? What patterns do you observe? What might account for those patterns?
3. The slope of a line is found by forming the ratio of the change in y to the change in x between any two points on the line. What is the slope of the line formed by the data points in the above graph? Explain how you know.

d. According to the graph, in a 40-hour week, how much will the average machinist earn? How do you know?