**THE SINE LAW**

**KEY WORDS**

Sine rule

Side

Opposite

Length

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| --- |
| So far, we’ve used trigonometric ratios to solve right angle triangles. The \_\_\_\_ \_\_\_\_\_ can be used in any triangle (not just right-angled triangles) where a \_\_\_\_ and its \_\_\_\_\_\_ angle are known. |

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| **CASE 1) FINDING SIDE** **GIVEN 🡪 ANGLE – ANGLE – SIDE** |
| If you need to find the **\_\_\_\_\_\_\_** of a side, you need to use the version of the Sine Rule where the lengths are on the top:

|  |  |  |  |
| --- | --- | --- | --- |
|       | *a* | = | *b* |
| sin(*A*) | sin(*B*) |

You will only ever need two parts of the Sine Rule formula, not all three.You will need to know at least one pair of a side with its opposite angle to use the Sine Rule. |

**Solved Example:** Determine the length of x:



|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Step 1 | Start by writing out the Sine Rule formula for finding sides:

|  |  |  |  |
| --- | --- | --- | --- |
|       | *a* | = | *b* |
| sin(*A*) | sin(*B*) |

 |
| Step 2 | Fill in the values you know, and the unknown length:

|  |  |  |  |
| --- | --- | --- | --- |
|       | *x* | = | 7 |
| sin(80°) | sin(60°) |

Remember that each fraction in the Sine Rule formula should contain a side and its opposite angle. |
| Step 3 | Solve the resulting equation to find the unknown side, giving your answer to 3 significant figures:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | *x* | = | 7 |      *(multiply by sin(80°) on both sides)* |
| sin(80°) | sin(60°) |
|  | *x* | = | 7 | × sin(80°) |
| sin(60°) |
|  | *x* | = | 7.96 |  |

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| **CASE 2) FINDING ANGLE** **GIVEN 🡪 SIDE – SIDE – OPPOSITE ANGLE** |
| If you need to find the size of an angle, you need to use the version of the Sine Rule where the angles are on the top:

|  |  |  |  |
| --- | --- | --- | --- |
|       | sin(*A*) | = | sin(*B*) |
| *a* | *b* |

As before, you will only need two parts of the Sine Rule , and you still need at least a side and its opposite angle. |

**Solved Example:**

Determine the angle to the nearest degree:





Therefore, the angle is 51o.

***PRACITCE:***

1. Find the measure of  to the nearest tenth of a degree.

**SOLVE**

To determine all unknown angles and sides.



1. Find the measure of side *e* to the nearest tenth.



1. Solve the triangle *ABC* given , cm, cm
2. Solve for the unknown value to the nearest tenth

|  |  |
| --- | --- |
| 1.
 | 1.
 |

1. Find the measure of to the nearest degree

|  |  |
| --- | --- |
| taBLM1-8-1s3-2 |  |

1. Find the measure of the indicated side to the nearest tenth.

|  |  |
| --- | --- |
| 1. taBLM1-8-1s3-4
 | 1. taBLM1-8-1s3-6
 |

1. Solve each triangle *ABC*.

|  |  |
| --- | --- |
| 1.
 | 1. Given , ,
 |

1. a) Use the **sine ratio** to find the value of *x*, to the nearest tenth

b) Use the **sine law** to find the value of *x*, to the nearest tenth

1. Two guy wires 27 m and 15 m in length are to be fastened to the top of a TV tower from two points B and C as shown. The angle of elevation to the top of the tower of the longer wire is . How far apart are points B and C and how tall is the tower?

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