**2.4: Investigate - Optimizing 2-Dimensional Shapes**

***Goal: Discover the optimal perimeter and area for 2-dimensional figures***

Pick an animal: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Name your animal: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

***PROBLEM ONE – OPTIMIZE (MAXIMIZE) AREA***

You need to build a rectangular pen for your pet \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, named \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

You are given a set amount of fencing (perimeter) to use and you want to optimize the area.

Why would you want to optimize the area?

***SCENERIO 1*: You have 12 m of fence**

Draw the three **rectangular** enclosures that you could build with 12 m of fence below and determine which has the largest area.

|  |  |  |
| --- | --- | --- |
| **Enclosure 1** | **Enclosure 2** | **Enclosure 3** |
|  |  |  |
| **Perimeter = 12 m** | **Perimeter = 12 m** | **Perimeter = 12 m** |
| **Dimensions =**  | **Dimensions =** | **Dimensions =** |
| **Area =**  | **Area =** | **Area =** |

Given a set **perimeter of 12 m** the enclosure with dimensions
\_\_\_\_\_\_\_\_ x \_\_\_\_\_\_\_\_ gives an optimal area of \_\_\_\_\_\_\_\_\_ m2.

***SCENERIO 2*: You have 16 m of fence**

Draw the four **rectangular** enclosures that you could build with 16 m of fence below and determine which has the largest area.

|  |  |  |  |
| --- | --- | --- | --- |
| **Enclosure 1** | **Enclosure 2** | **Enclosure 3** | **Enclosure 4** |
|  |  |  |  |
| **Perimeter = 16m** | **Perimeter = 16m** | **Perimeter = 16m** | **Perimeter = 16m** |
| **Dimensions =**  | **Dimensions =** | **Dimensions =** | **Dimensions =** |
| **Area =**  | **Area =** | **Area =** | **Area =** |

Given a set **perimeter of 16 m** the enclosure with dimensions
\_\_\_\_\_\_\_\_ x \_\_\_\_\_\_\_\_ gives an optimal area of \_\_\_\_\_\_\_\_\_ m2.

***SCENERIO 3*: You have 20 m of fence**

Draw the five **rectangular** enclosures that you could build with 20 m of fence below and determine which has the largest area.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Enclosure 1** | **Enclosure 2** | **Enclosure 3** | **Enclosure 4** | **Enclosure 5** |
|  |  |  |  |  |
| **Perimeter = 20m** | **Perimeter = 20m** | **Perimeter = 20m** | **Perimeter = 20m** | **Perimeter = 20m** |
| **Dimensions =**  | **Dimensions =** | **Dimensions =** | **Dimensions =** | **Dimensions =** |
| **Area =**  | **Area =** | **Area =** | **Area =** | **Area =** |

Given a set **perimeter of 20 m** the enclosure with dimensions
\_\_\_\_\_\_\_\_ x \_\_\_\_\_\_\_\_ gives an optimal area of \_\_\_\_\_\_\_\_\_ m2.

***![C:\Users\Vicki\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\QK3E7K61\MC900384226[1].wmf]()PROBLEM TWO – OPTIMIZE (MINIMIZE) PERIMETER***

This time your pet, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, named \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ has trampled your garden and destroyed all of your award winning pumpkins. You need to rebuild the garden **keeping the area set at 36 m2** but this time you are going to build a fence to keep \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ out. You need to determine the amount of fencing required to ***optimize*** the perimeter of the garden.

Why would you want to optimize perimeter?

***SCENERIO*: You have an area of 36 m2 to fence**

Draw the five **rectangular** enclosures that you could build around the 36 m2 of garden and determine the smallest perimeter.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Enclosure 1** | **Enclosure 2** | **Enclosure 3** | **Enclosure 4** | **Enclosure 5** |
|  |  |  |  |  |
| **Area = 36 m2** | **Area = 36 m2** | **Area = 36 m2** | **Area = 36 m2** | **Area = 36 m2** |
| **Dimensions =**  | **Dimensions =** | **Dimensions =** | **Dimensions =** | **Dimensions =** |
| **Perimeter =**  | **Perimeter =**  | **Perimeter =**  | **Perimeter =**  | **Perimeter =**  |

Given a set **area of 32 m2** the enclosure with dimensions
\_\_\_\_\_\_\_\_ x \_\_\_\_\_\_\_\_ gives an optimal perimeter of \_\_\_\_\_\_\_\_\_ m.

***CONCLUSIONS***

What can you conclude about optimizing area given a set perimeter?

What can you conclude about optimizing perimeter given a set area?

Without drawing the rectangular enclosures use what you have learned above to determine the optimal area/perimeter for problems

|  |  |  |
| --- | --- | --- |
| **Perimeter = 100 cm** | **Perimeter = 360 m** | **Perimeter = 562 m** |
| **Area = 49 m2** | **Area = 112 m2** | **Area = 570 m2** |