

# Sex Determination Interactive Questions

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We all know genetic sex determination in Humans:

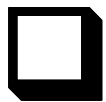
**XY is Male**

**XX is Female**

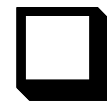
Sometimes mistakes happen during Meiosis...

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1. If a mistake occurs that results in an XO individual, what sex would you expect this individual to be?



**Male**



**Female**

- 
1. If a mistake occurs that results in an XO individual, what sex would you expect this individual to be?
  2. Male is the wrong answer. Remember our discussions of the SRY gene? Take a look at Lecture 1: T2: C15 for more information on the function of the SRY gene product.



**Male**



**Female**

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1. If a mistake occurs that results in an XO individual, what sex would you expect this individual to be?
  2. Female is the right answer. Because of the absence of the SRY gene, no male characteristics can develop. XO females have what is known as “Turner Syndrome.”



**Male**



**Female**

We all know genetic sex determination in Humans:

**XY is Male**

**XX is Female**

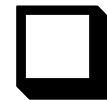
Sometimes mistakes happen during Meiosis...

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2. If a mistake results in an XXY individual, what sex would you expect this individual to be?



**Male**

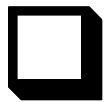


**Female**

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2. If a mistake results in an XXY individual, what sex would you expect this individual to be?

Female is the wrong answer. If a Y chromosome is present, the SRY gene product will cause the production of male characteristics. See Lecture 1: T2: C15 for discussion of the function of the SRY gene.



**Male**



**Female**

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2. If a mistake results in an  $XXY$  individual, what sex would you expect this individual to be?

Male is the correct answer. The Y chromosome is present and probably has a functional SRY gene.



**Male**



**Female**

In Fruit Flies, *Drosophila melanogaster*,  
sex determination is different from Humans:  
the **RATIO** of the number of copies of X chromosomes  
to the number of copies of autosomes determines sex.  
The Y chromosome does not contribute to sex determination.

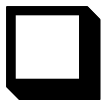


**XY is Male** because the Ratio is 1X:2 autosomes

**XX is Female** because the Ratio is 2X:2 autosomes

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3. If a mistake results in an XO Fruit Fly, what sex would you expect this individual to be?



Male



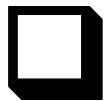
Female



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3. If a mistake results in an XO Fruit Fly, what sex would you expect this individual to be?

Female is the wrong answer. The **RATIO** of X chromosomes to autosomes is 1:2. Remember that the **RATIO** of X chromosomes to autosomes has to be 2:2 to produce a female. See Lecture 1: T2: C12 for a discussion of *Drosophila* sex determination.



**Male**



**Female**



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3. If a mistake results in an XO Fruit Fly, what sex would you expect this individual to be?

Male is the correct answer. The **RATIO** of X chromosomes to autosomes is 1:2. Remember that the Y chromosome does not contribute to sex determination.



**Male**



**Female**

## **Sometimes chromosomes don't even matter!**

Among reptiles, about 25% have  
genetically-determined sexes,  
but 75% have

**“ENVIRONMENTAL SEX DETERMINATION”**

**The** *most common Environmental Factor = Temperature*

## Scenario

You are a herpetologist who is studying the Common Snapping Turtle, *Chelydra serpentina*. You want to find out if sex is determined by temperature.

**So You INVESTIGATE....**

*Let's set up an experiment*



We have 2 Incubators in which to house 2 groups of snapping turtles.

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Do we set them at the SAME or DIFFERENT temperatures?

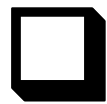
Same

Different

We have 2 Incubators in which to house 2 groups of snapping turtles.

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Do we set them at the SAME or DIFFERENT temperatures?



**Same**



**Different**

**YES!** To conduct a scientific experiment, we need to begin to change **VARIABLES** in order to answer questions.

So we set our incubators to 22° C and 26° C. We find that our baby turtles are all male.

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What do you think? Select one:

- a) You conclude sex is genetic.
- b) You conclude that sex is affected by temperature.
- c) You conclude that you should study a wider range of temperatures.

So we set our incubators to 22° C and 26° C. We find that our baby turtles are all male.

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What do you think? Select one:

- a) You conclude sex is genetic.
- b) You conclude that sex is affected by temperature.
- c) You conclude that you should study a wider range of temperatures.
- d) TRICK QUESTION! C is the right answer. In nature, 22° and 26° are not different enough to affect changes.
- e) Next question:

So we set our incubators to 22° C and 30° C. We find that the baby turtles in the 30° C incubator are all female!

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At what temperature do you think you will get an exact 50:50 ratio? Select one:

- a) 20° C
- b) 28° C
- c) 30° C

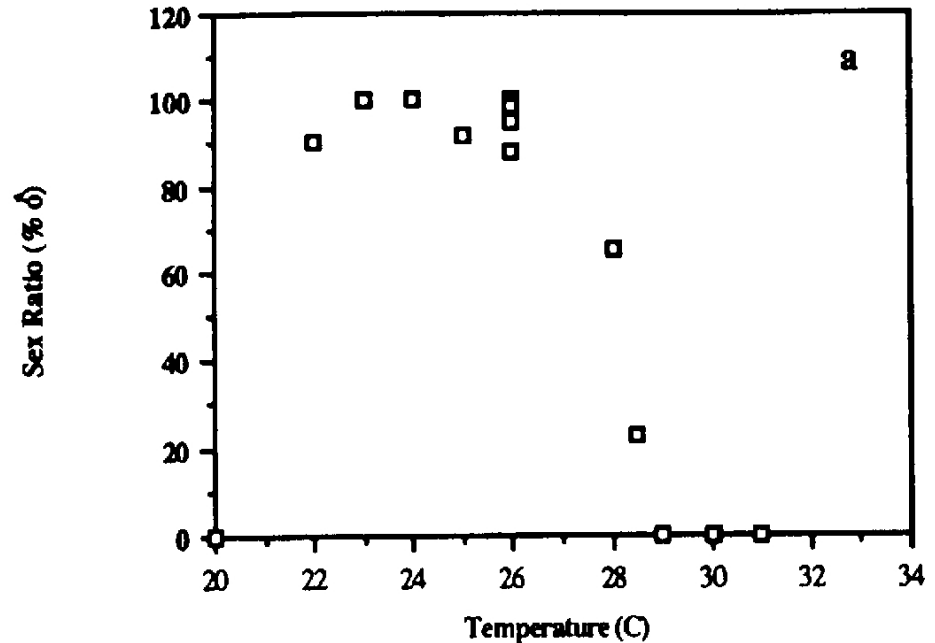
So we set our Incubators to 22° C and 30° C. We find that the baby turtles in the 30° C incubator are all Female!

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At what temperature do you think you will get an exact 50:50 ratio? Select one:

- a) 20° C
- b) 28° C
- c) 30° C

You can see by this graph of real data that, though it isn't a perfect switch, at around 26° C almost all offspring are male, and at around 30° C almost none of the offspring are male.



Janzen, FJ and Paukstis GL. Quarterly Review of Biology, 1991. Jun 66(2): 149-179.