

Ray Diagrams for **Lenses**

Quizzes and Solutions

by Robert Prior

Ray Diagrams for Lenses

Quizzes and Solutions

I find my students gain confidence from lots of little quizzes. To that end I've produced a number of ray diagrams formatted to be given as quizzes.

I always have students draw three rays to locate the image, which provides them with a way to check their accuracy.

For clarity, I draw each ray in a different colour. This booklet uses **red** for rays through the optical centre, **green** for rays through the principal focus, and **blue** for rays through the secondary focus.

Real rays, which represent the path followed by a beam of light, are drawn as solid lines:



Virtual rays, which represent the path that a beam of light appears to follow, are drawn as dashed lines:



Solutions are provided, but a marking scheme is not. You should use a scheme that reflects what you consider important.



Engraving on the title page of the **Thesaurus opticus**

Name

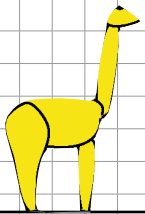
Section

Physics

Instructions

Label the following:

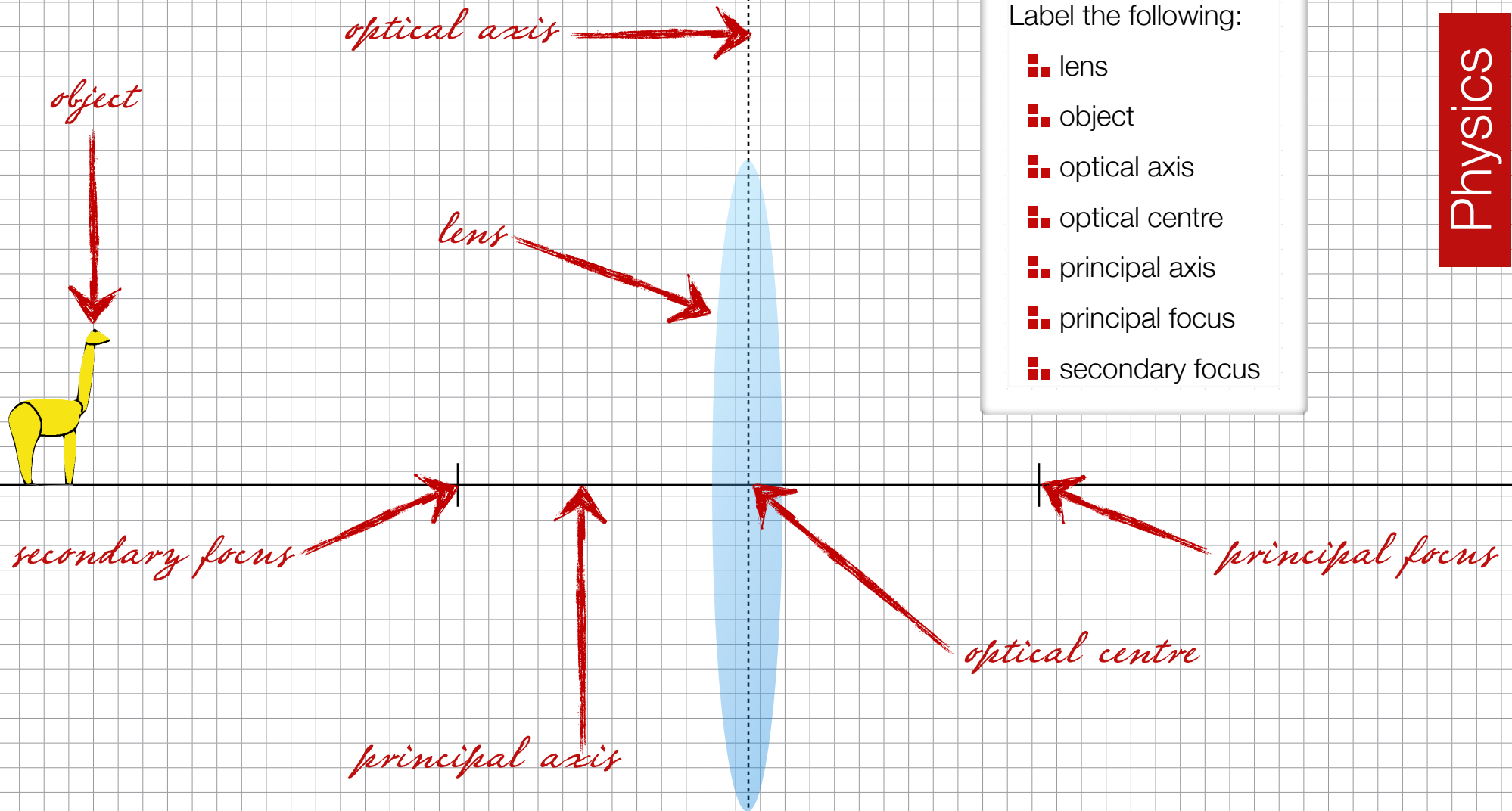
- lens
- object
- optical axis
- optical centre
- principal axis
- principal focus
- secondary focus



Instructions

Label the following:

- lens
- object
- optical axis
- optical centre
- principal axis
- principal focus
- secondary focus



Name

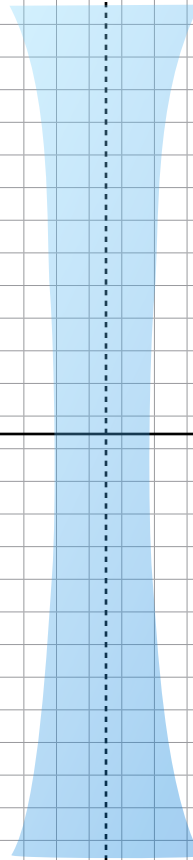
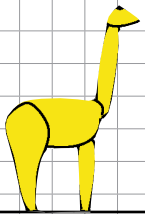
Section

Physics

Instructions

Label the following:

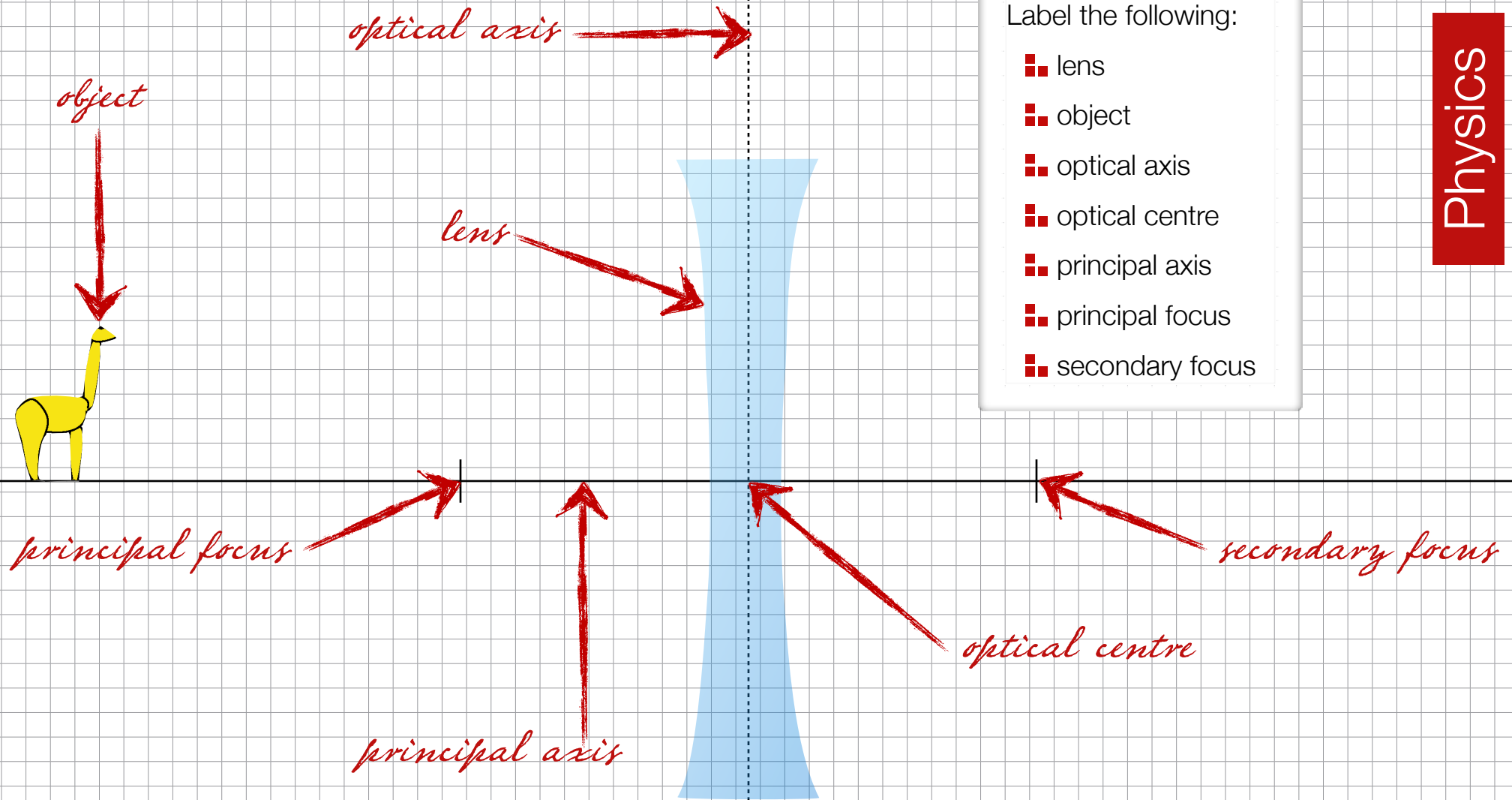
- lens
- object
- optical axis
- optical centre
- principal axis
- principal focus
- secondary focus



Instructions

Label the following:

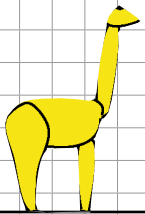
- lens
- object
- optical axis
- optical centre
- principal axis
- principal focus
- secondary focus



Name

Section

Physics



Instructions

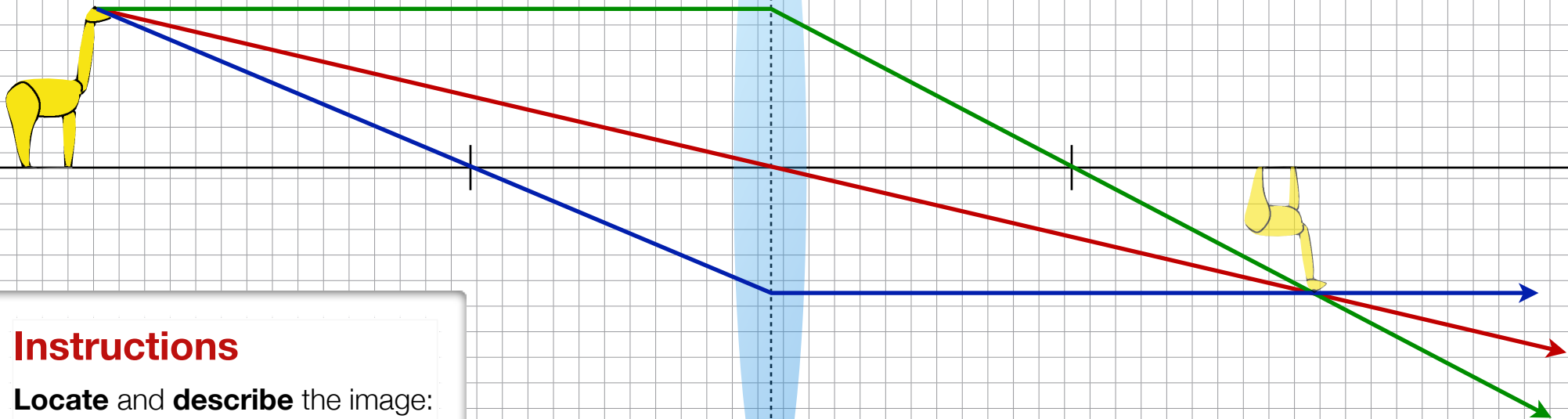
Locate and **describe** the image:

S _____

A _____

L _____

T _____



Instructions

Locate and **describe** the image:

S smaller

A inverted

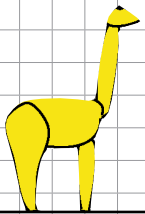
L between F and $2F$

T real

Name

Section

Physics



Instructions

Locate and **describe** the image:

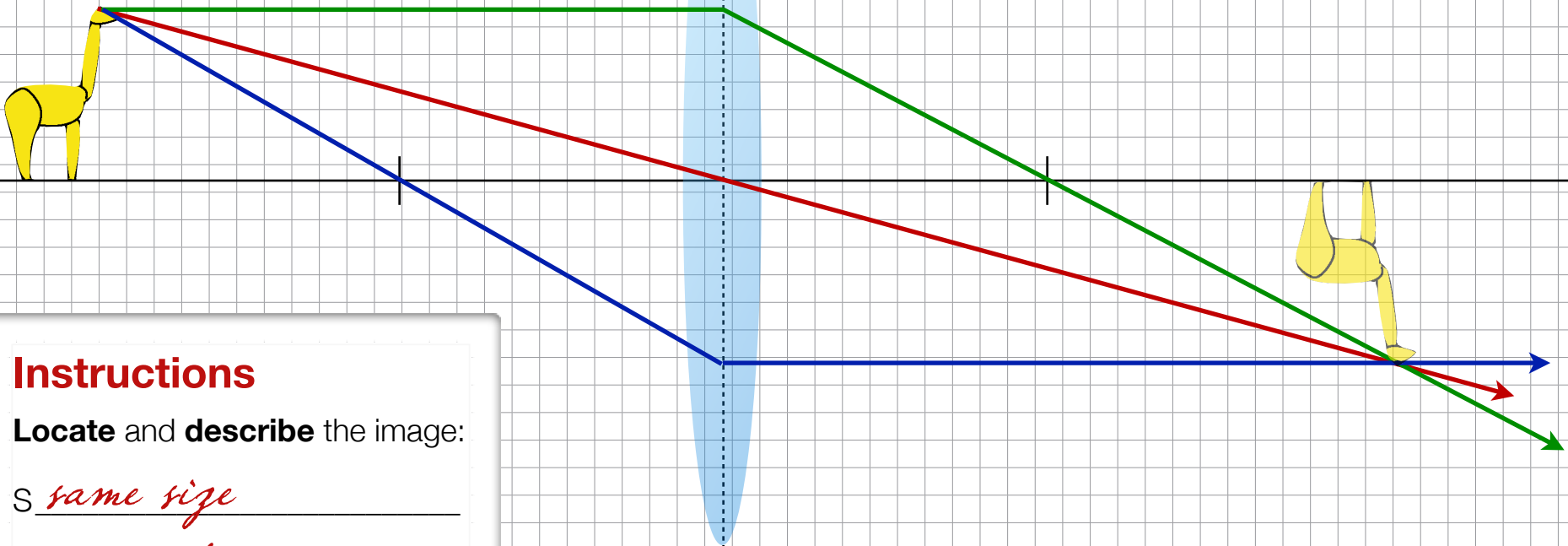
S _____

A _____

L _____

T _____

D



Instructions

Locate and **describe** the image:

S same size

A inverted

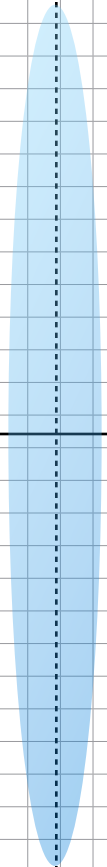
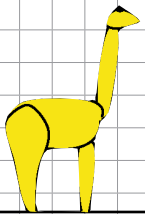
L at $2F$

T real

Name _____

Section _____

Physics



Instructions

Locate and **describe** the image:

S _____

A _____

L _____

T _____





Instructions

Locate and **describe** the image:

S larger

A inverted

L beyond $2F$

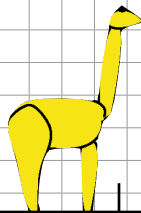
T real



Name

Section

Physics



Instructions

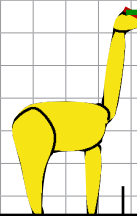
Locate and **describe** the image:

S _____

A _____

L _____

T _____



*Rays are parallel, therefore
no image will be formed.*

Instructions

Locate and **describe** the image:

S no image

A _____

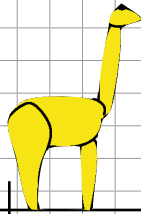
L _____

T _____

Name

Section

Physics



Instructions

Locate and **describe** the image:

S _____

A _____

L _____

T _____

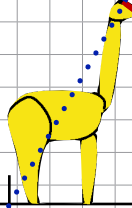
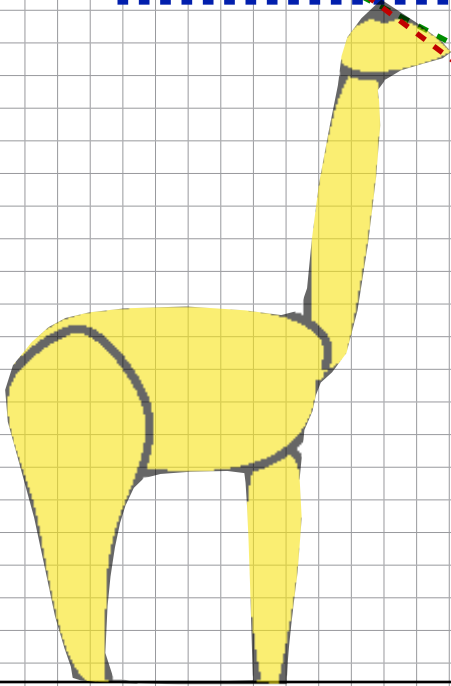


Name _____

Answer Key

Section _____

Physics



Instructions

Locate and **describe** the image:

S larger

A upright

L between C and F

T virtual

Name

Section

Physics

Instructions

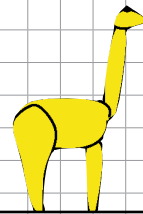
Locate and **describe** the image:

S _____

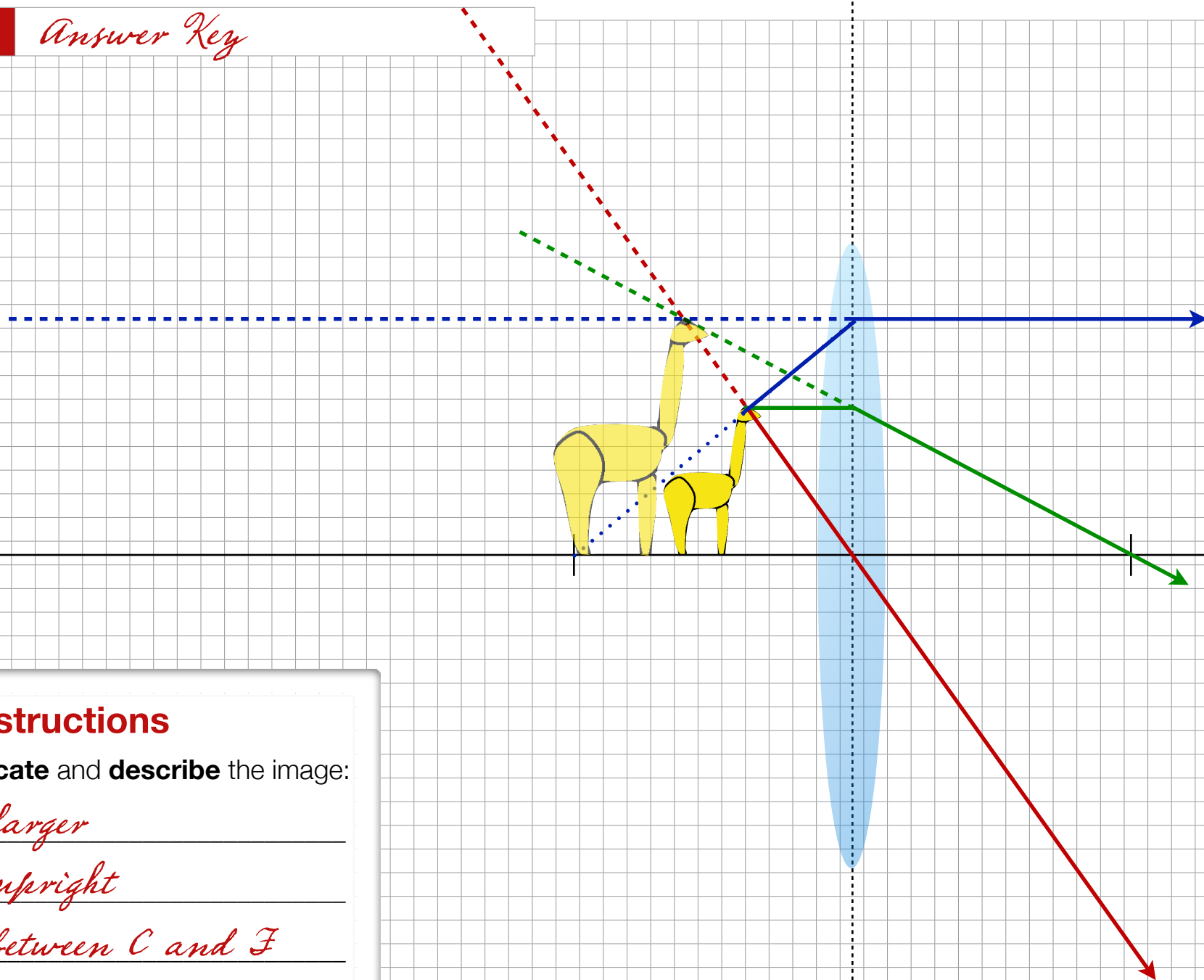
A _____

L _____

T _____



H



Instructions

Locate and **describe** the image:

S larger

A upright

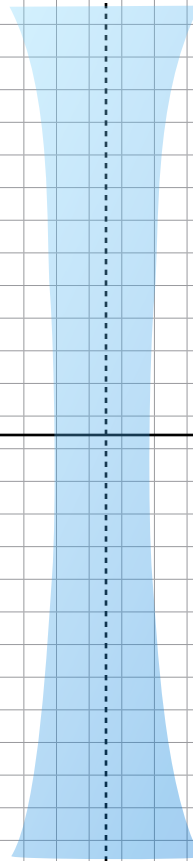
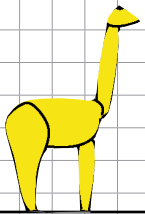
L between C and F

T virtual

Name

Section

Physics



Instructions

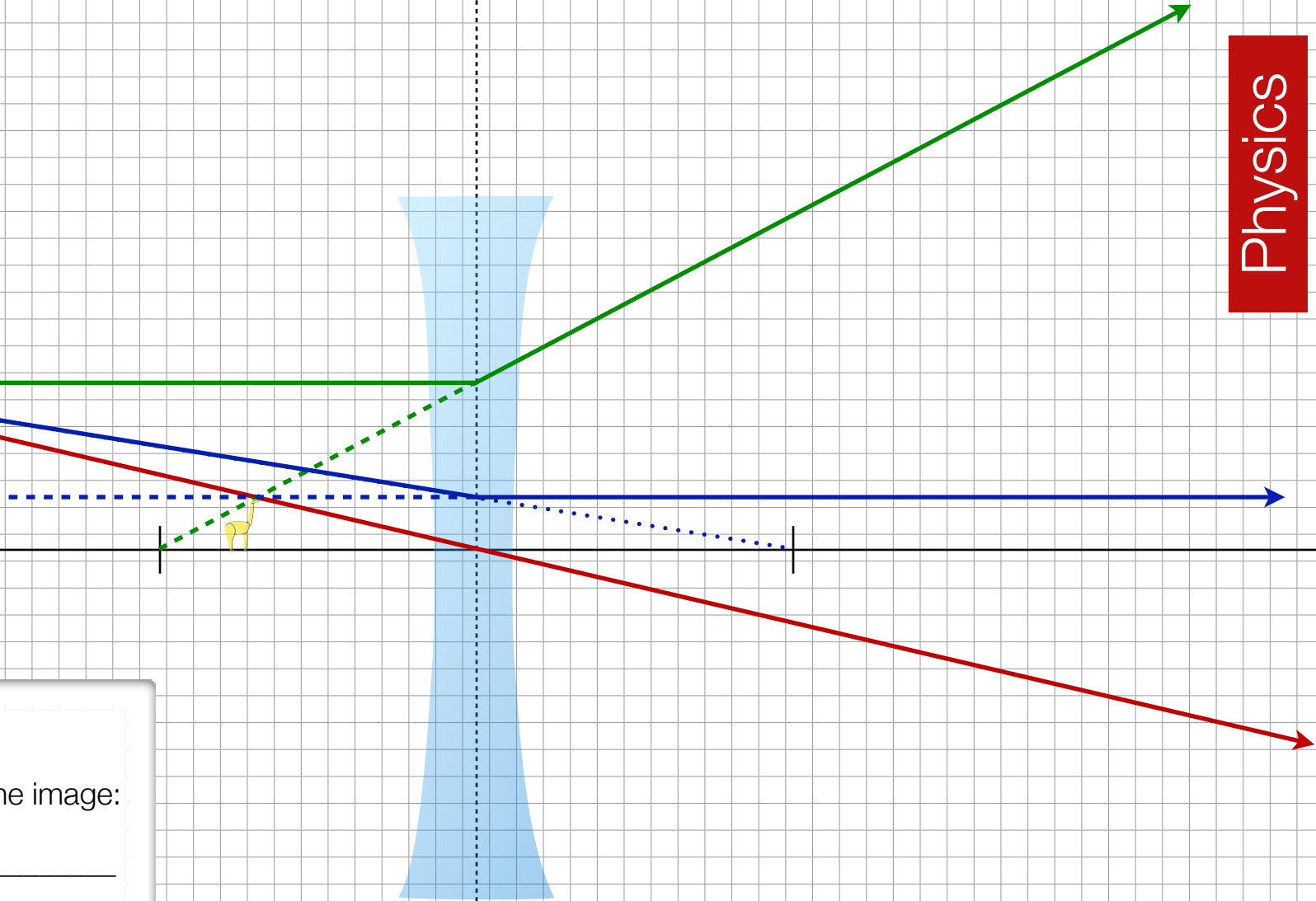
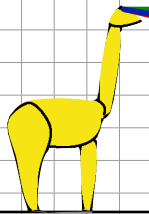
Locate and **describe** the image:

S _____

A _____

L _____

T _____



Instructions

Locate and **describe** the image:

S smaller

A upright

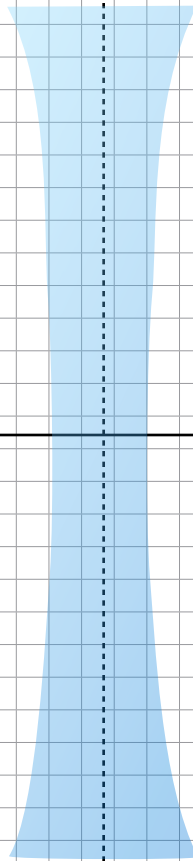
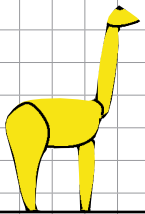
L between C and F

T virtual

Name _____

Section _____

Physics



Instructions

Locate and **describe** the image:

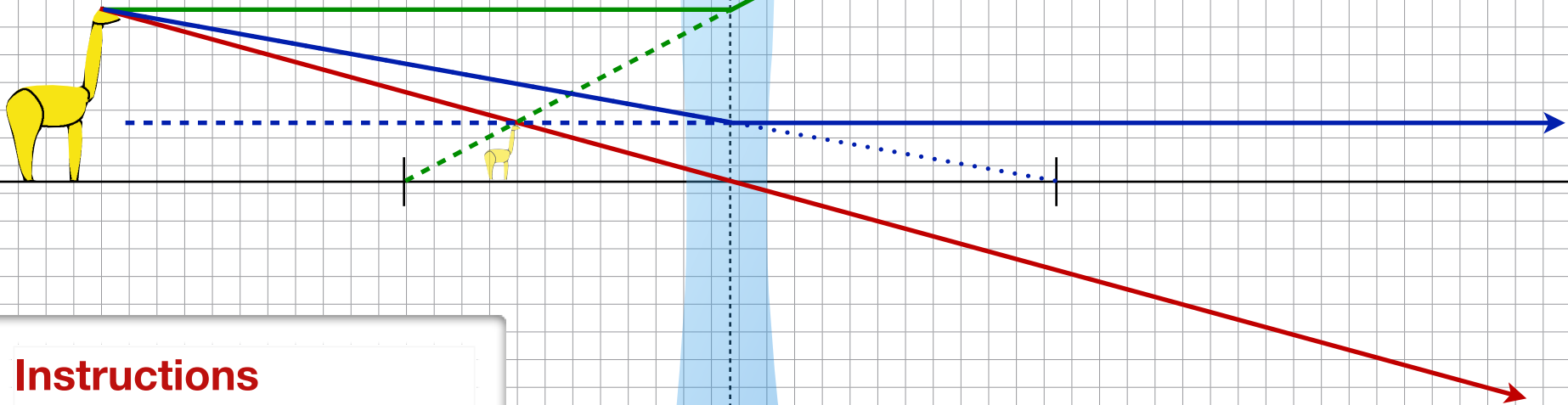
S _____

A _____

L _____

T _____





Instructions

Locate and **describe** the image:

S *smaller*

A *upright*

L *between C and F*

T *virtual*

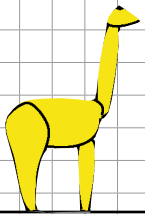
Name

Section

Instructions

Locate and **describe** the image

Physics



Name

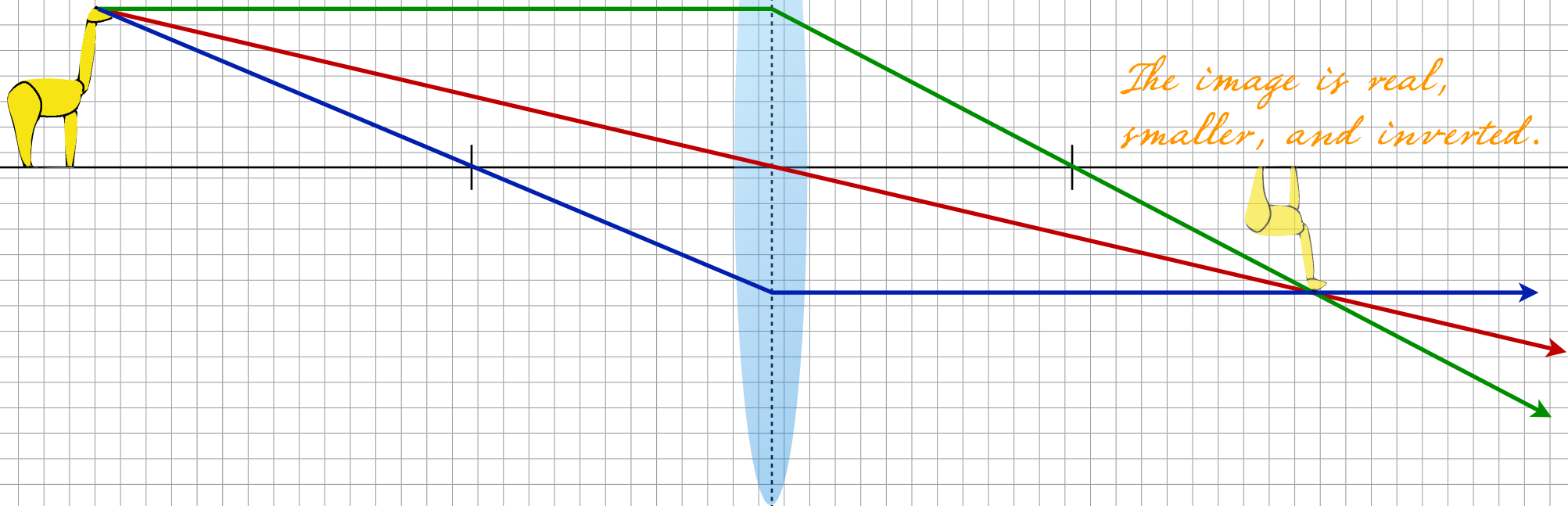
Answer Key

Instructions

Locate and **describe** the image

Section

Physics



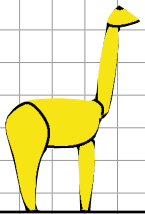
Name

Section

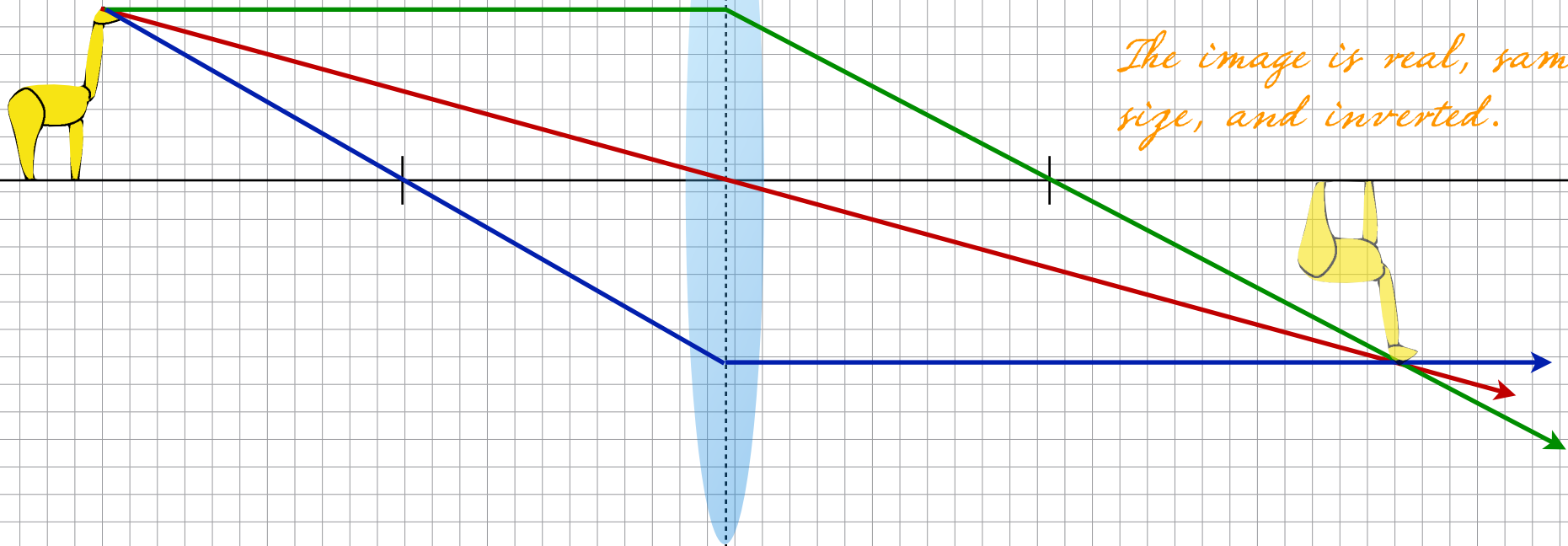
Instructions

Locate and **describe** the image

Physics



D

Instructions**Locate** and **describe** the image

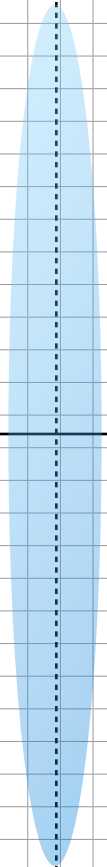
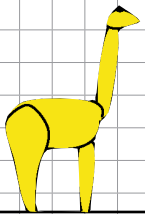
Name

Section

Instructions

Locate and **describe** the image

Physics



Name

Answer Key

Instructions

Locate and **describe** the image

Section

Physics



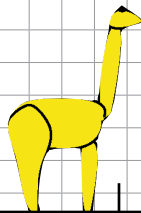
Name

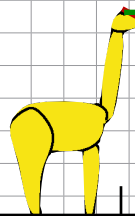
Section

Instructions

Locate and **describe** the image

Physics



Instructions**Locate** and **describe** the image

*Rays are parallel, therefore
no image will be formed.*

No image is formed.

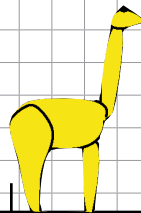
Name

Section

Instructions

Locate and **describe** the image

Physics



Name

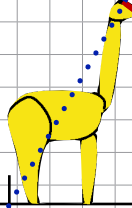
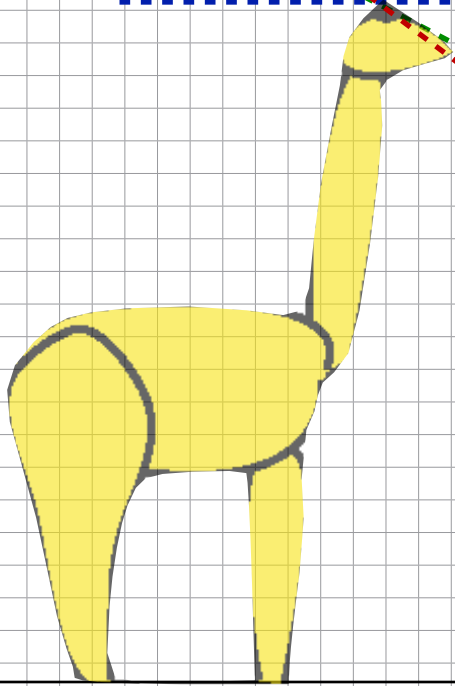
Answer Key

Section

Instructions

Locate and describe the image

Physics



The image is virtual,
larger, and upright.

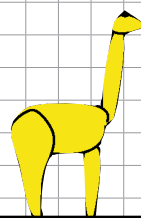
Name

Section

Instructions

Locate and **describe** the image

Physics



Name

Answer Key

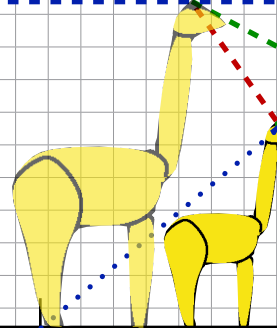
Section

Instructions

Locate and describe the image

Physics

The image is virtual, larger, and upright.



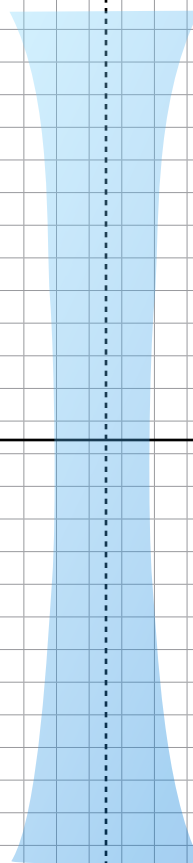
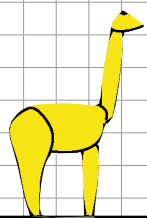
Name

Section

Instructions

Locate and **describe** the image

Physics



Name

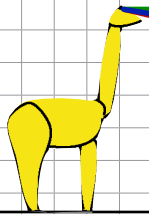
Answer Key

Instructions

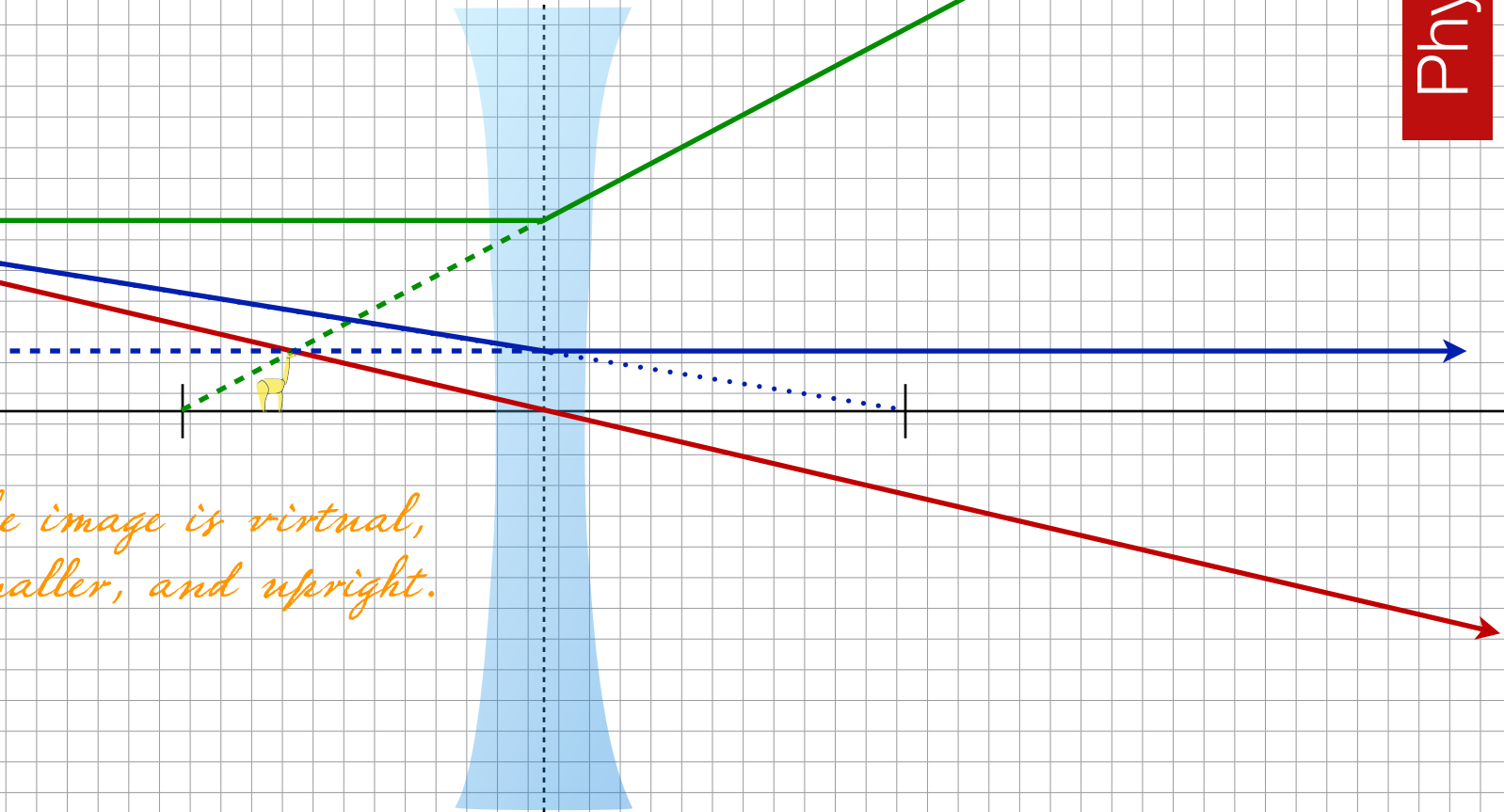
Locate and **describe** the image

Section

Physics



*The image is virtual,
smaller, and upright.*



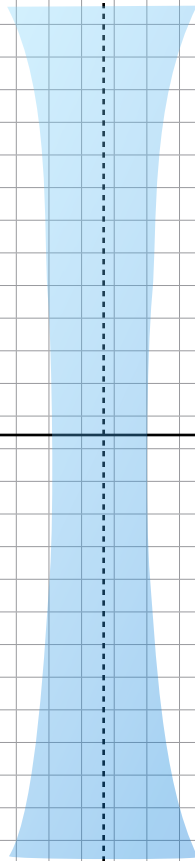
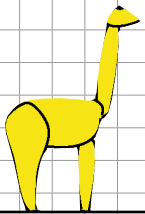
Name

Section

Instructions

Locate and **describe** the image

Physics



Name

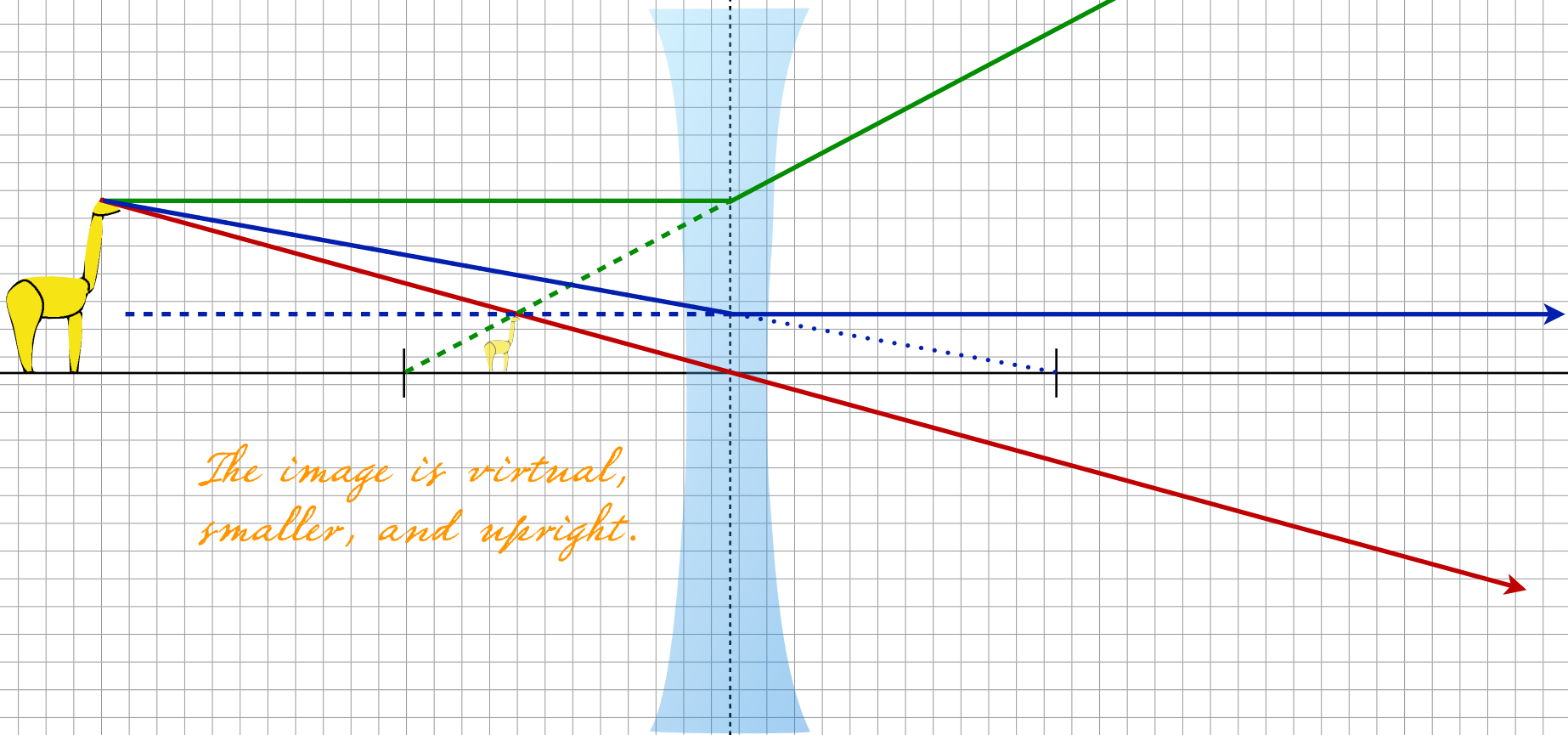
Answer Key

Section

Instructions

Locate and **describe** the image

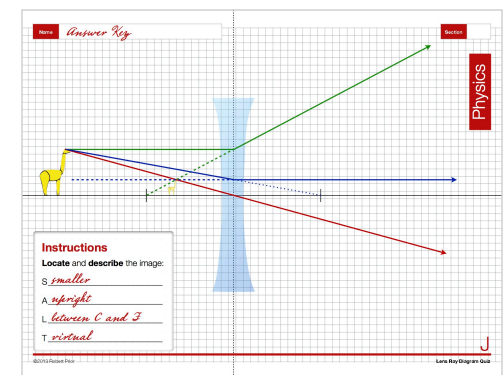
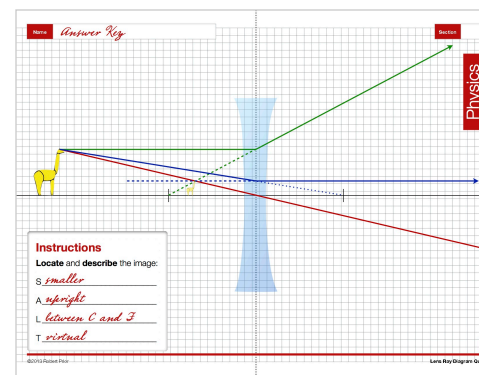
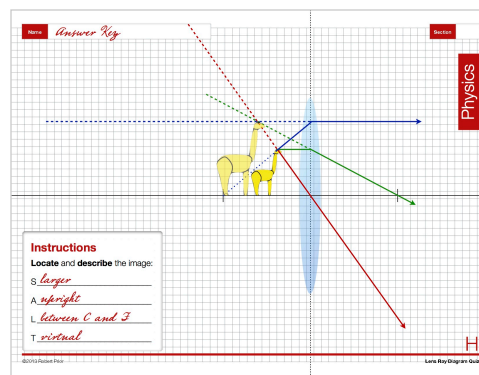
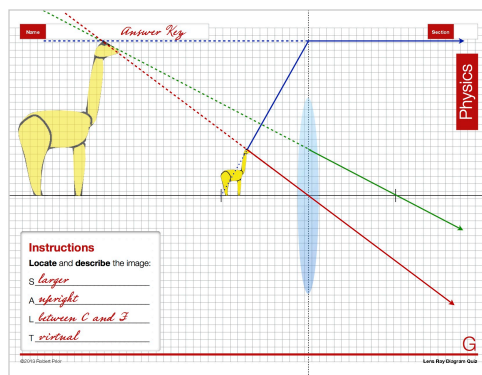
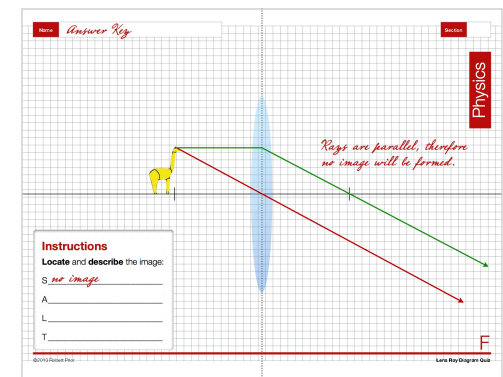
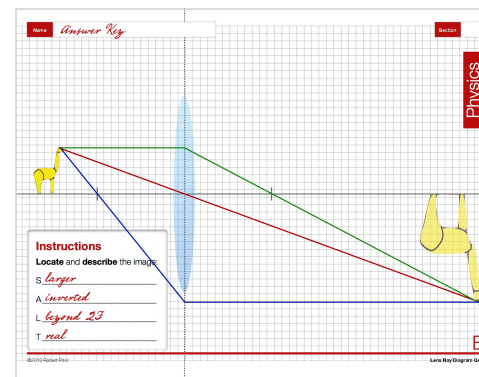
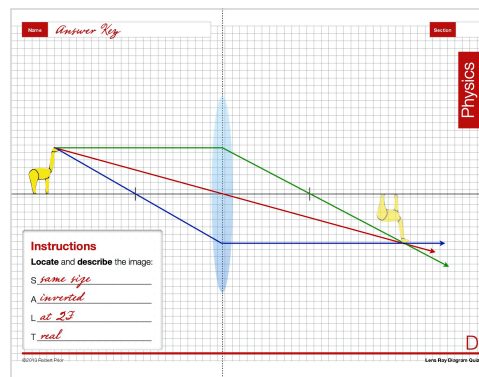
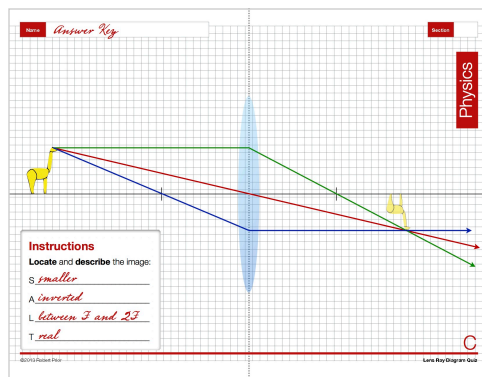
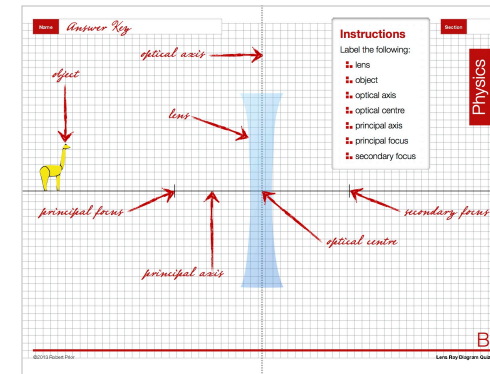
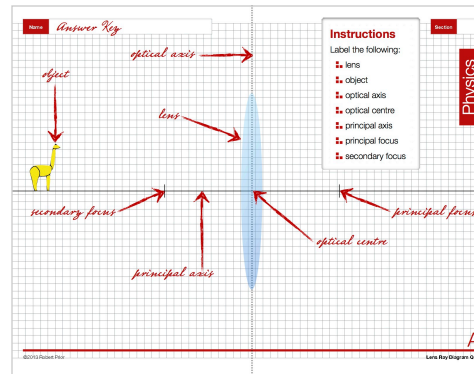
Physics



*The image is virtual,
smaller, and upright.*

Solutions

Solutions to the quizzes, presented on a single sheet for convenience.





Music is the arithmetic of sounds
as optics is the geometry of light.

Claude Debussy

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