

Kinematics



Practicing Vector Diagrams

Being able to add vectors graphically, using diagrams, is an important skill in many fields. These exercises will let you practice this skill.



Practicing Vector Diagrams

Instructions

For each of the following problems, draw a **vector scale diagram** to determine the object's total displacement.

On each diagram, clearly indicate a **scale** and the **direction** of north.

Indicate the starting position of the object with a small cross:

X

Draw the vectors as **solid directed line segments**:



Draw the resultant vectors as a **dashed directed line segment**:



Measure the length and direction of the resultant vector and convert the measurement back into a real world vector.

Very Easy Problems

These problems have vectors that are all at right angles to each other. They are very easy to draw.

Page 3

Easy Problems

The problems have vectors at right angles and at 45° to each other. They are easy to draw.

Page 7

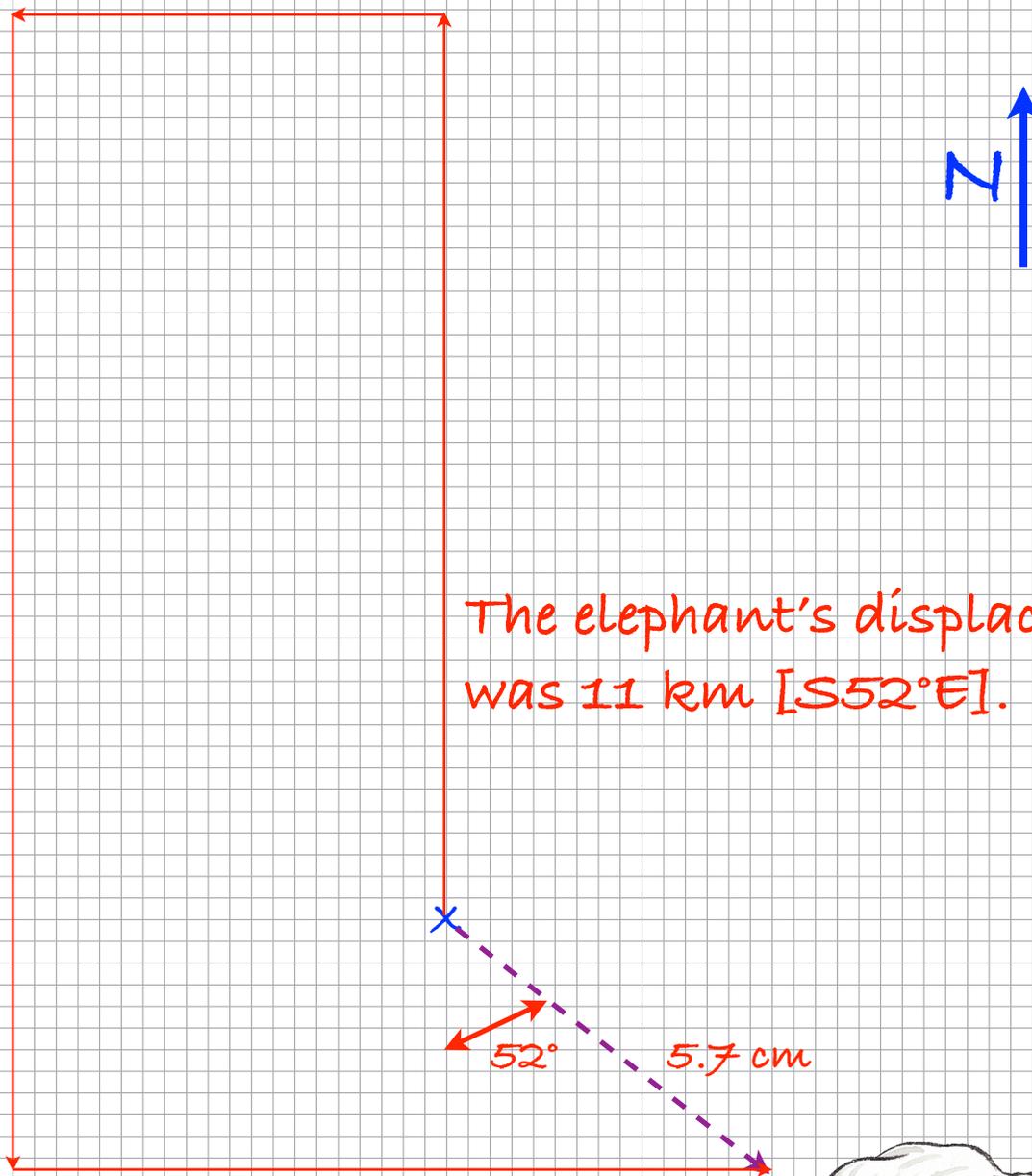
More Challenging Problems

The problems have vectors at many different angles to each other. They are more challenging to draw.

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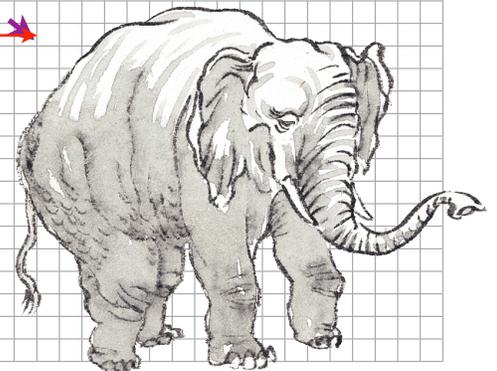
Perambulating Pachyderm

An elephant walks 25 km [N], 12 km [W], 32 km [S], and 21 km [E]. Use a vector diagram to find the elephant's displacement.



The elephant's displacement was 11 km [S52°E].

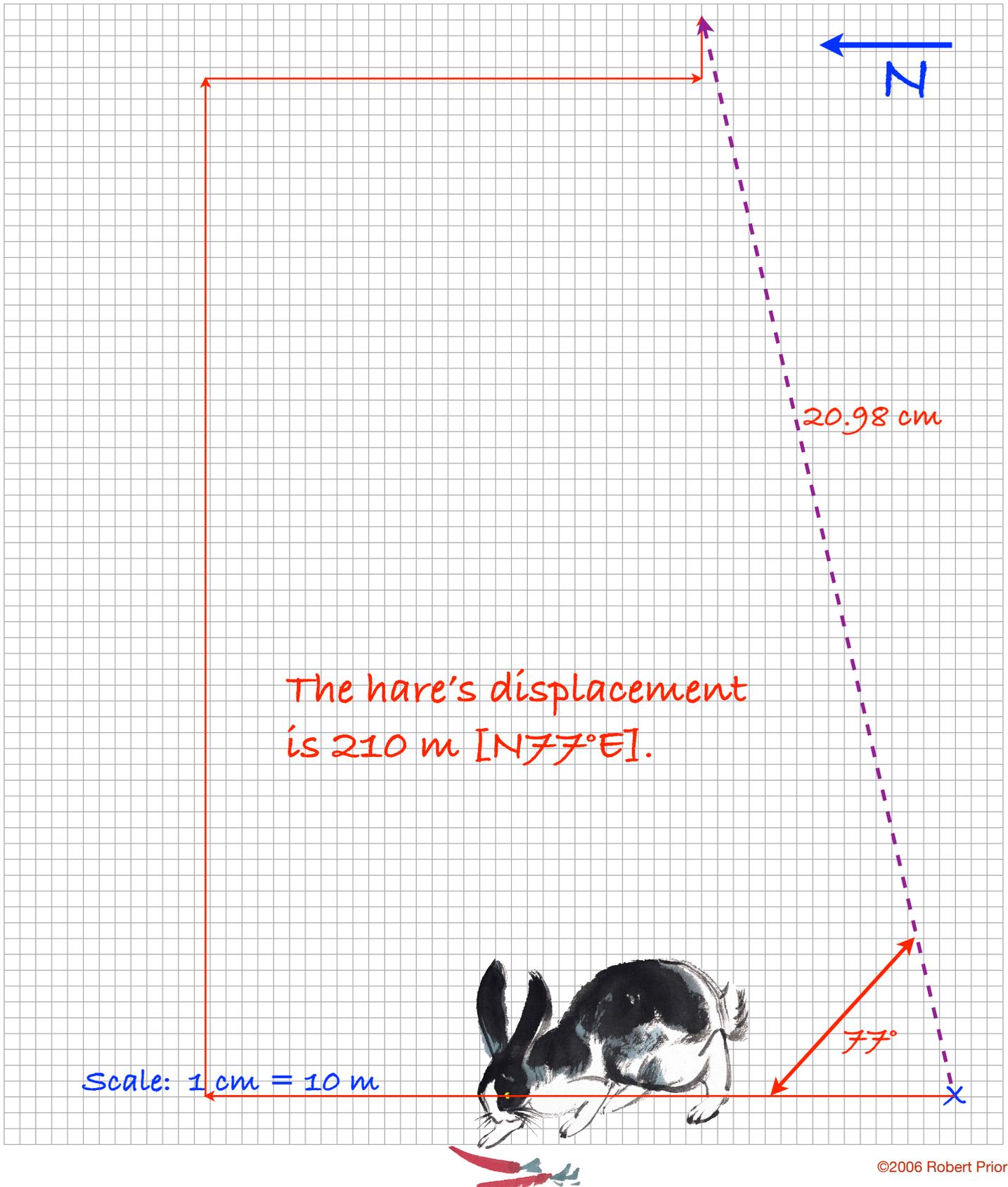
Scale: 1 cm = 2 km



Hopping Hares

A

A hare hops 142 m [N], 193 m [E], 94 m [S], and 12 m [E]. Use a vector diagram to find the hare's displacement.

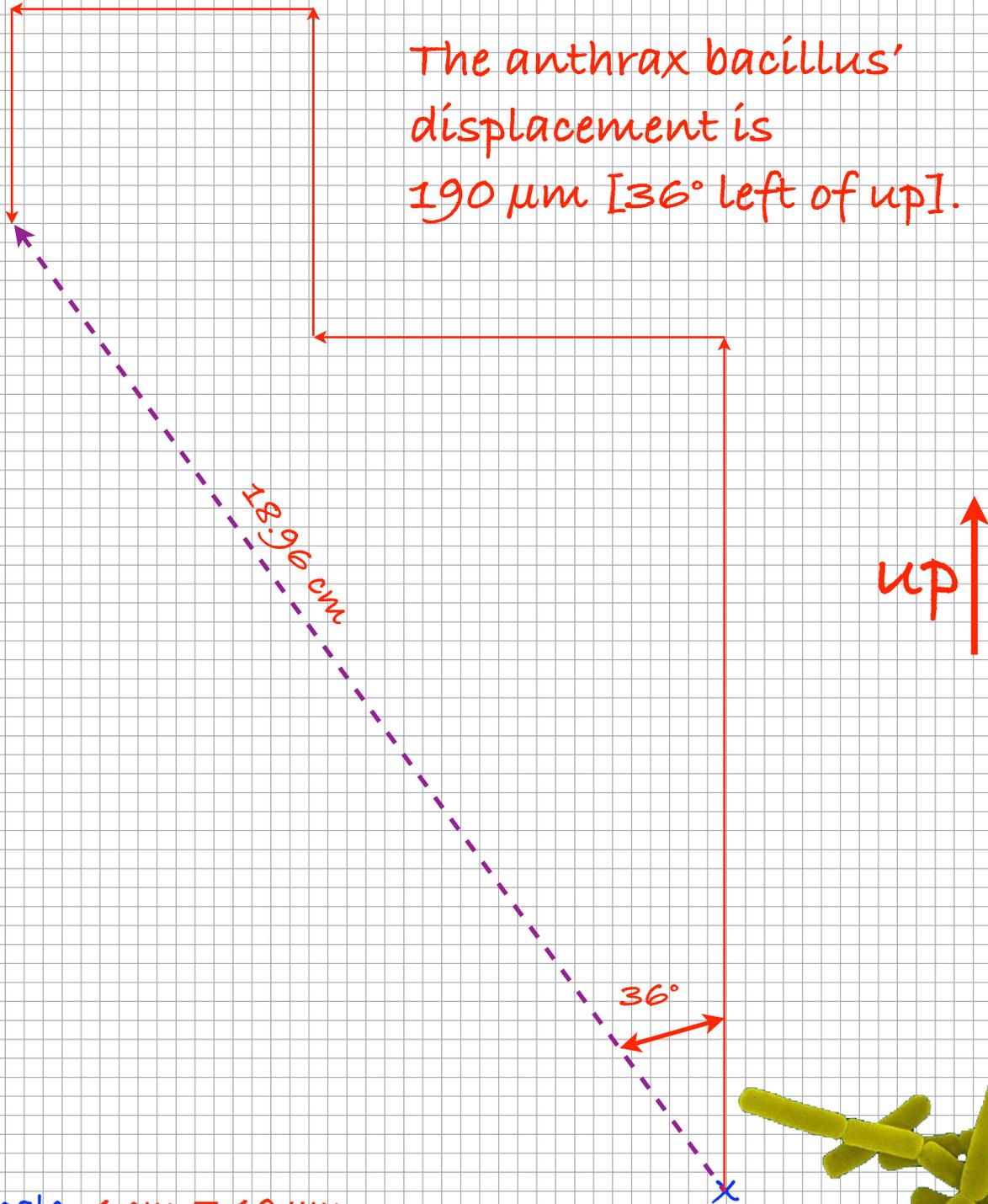


Ambulatory Anthrax

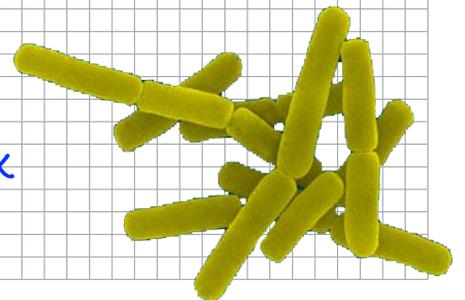
A

An anthrax bacillus moves $135\ \mu\text{m}$ [up], $65\ \mu\text{m}$ [left], $52\ \mu\text{m}$ [up], $48\ \mu\text{m}$ [left], and $34\ \mu\text{m}$ [down]. Use a vector diagram to find the anthrax bacillus' displacement.

The anthrax bacillus' displacement is $190\ \mu\text{m}$ [36° left of up].

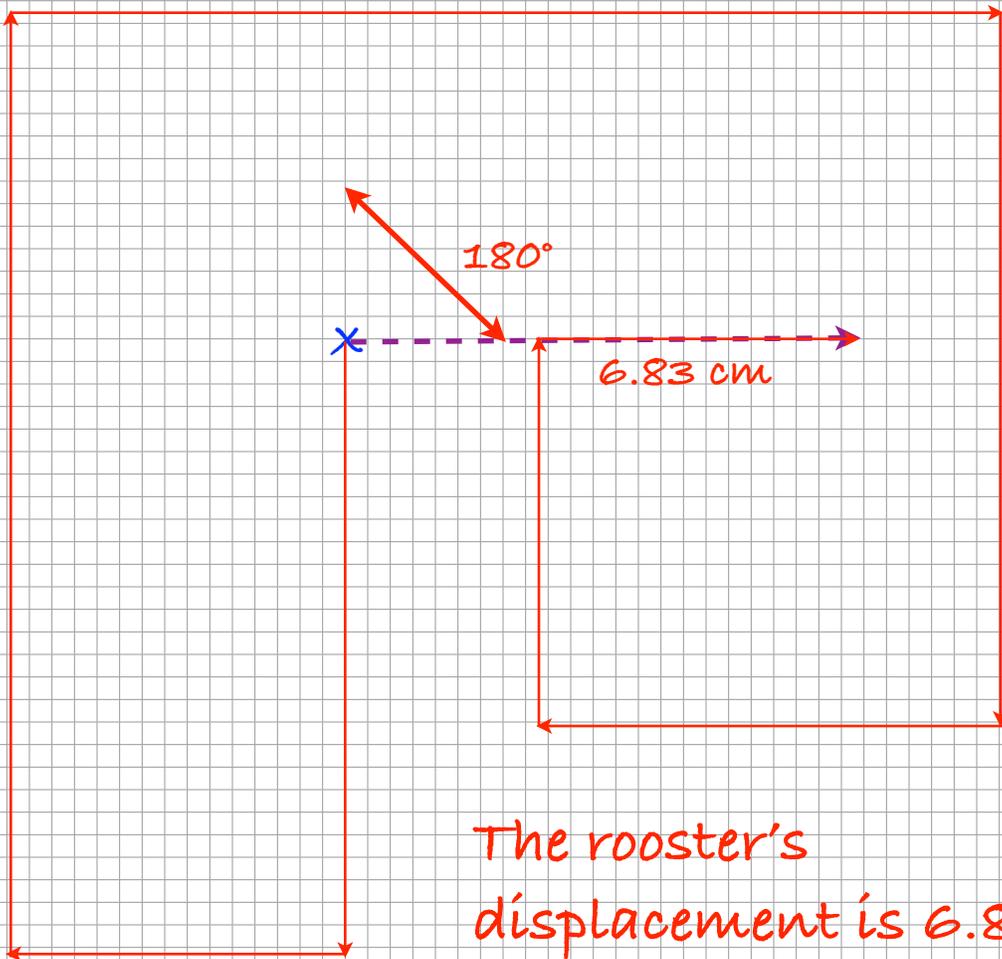


Scale: $1\ \text{cm} = 10\ \mu\text{m}$

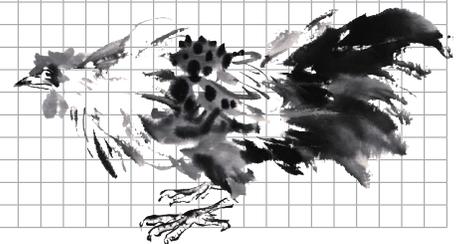


Roaming Roosters

A rooster walks 8.2 m [S], 4.5 m [W], 12.6 m [N], 13.2 m [E], 9.5 m [S], 6.2 m [W], 5.2 m [N], and 4.3 m [E]. Use a vector diagram to find the rooster's displacement.

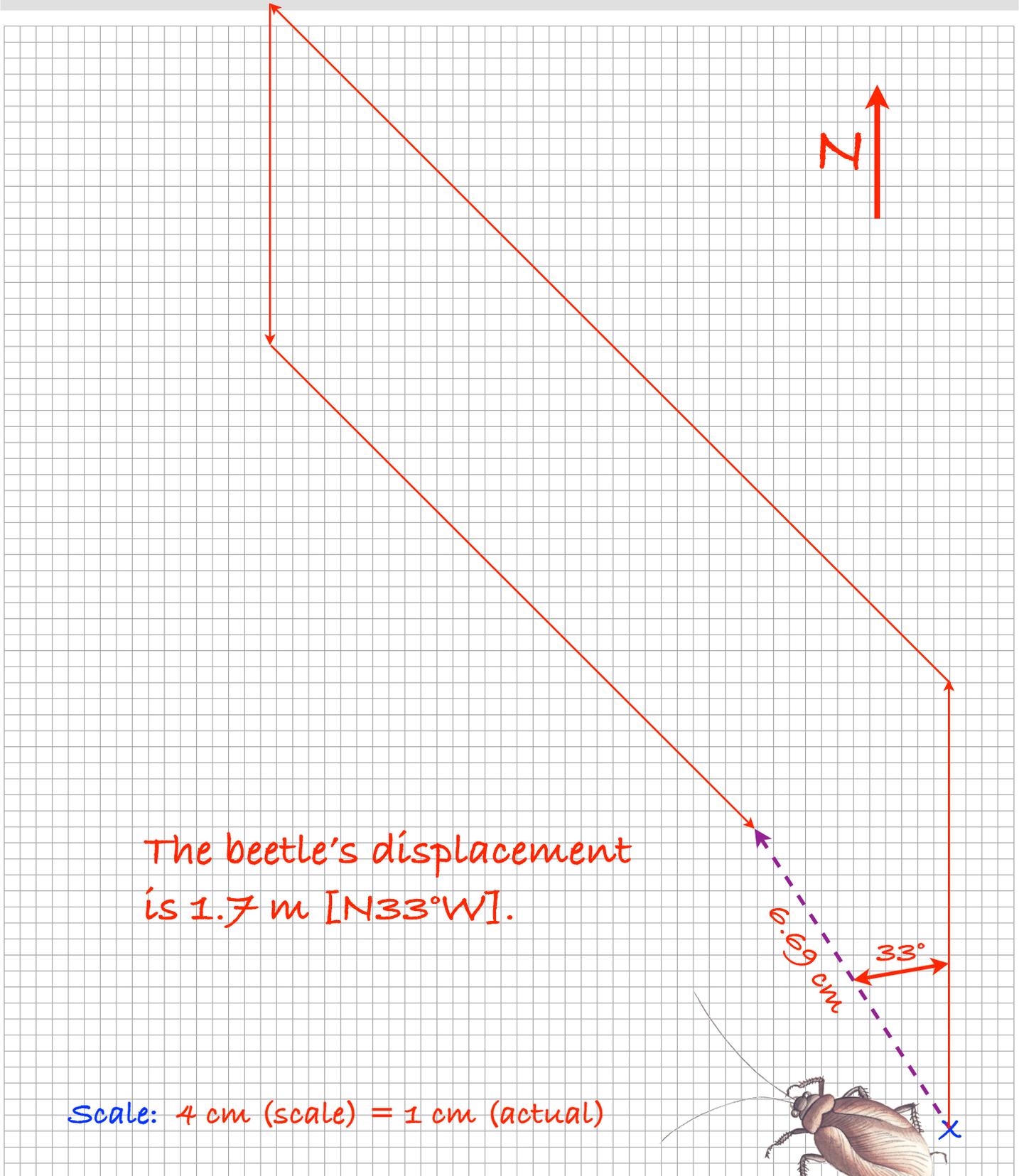


Scale: 1 cm = 1 m



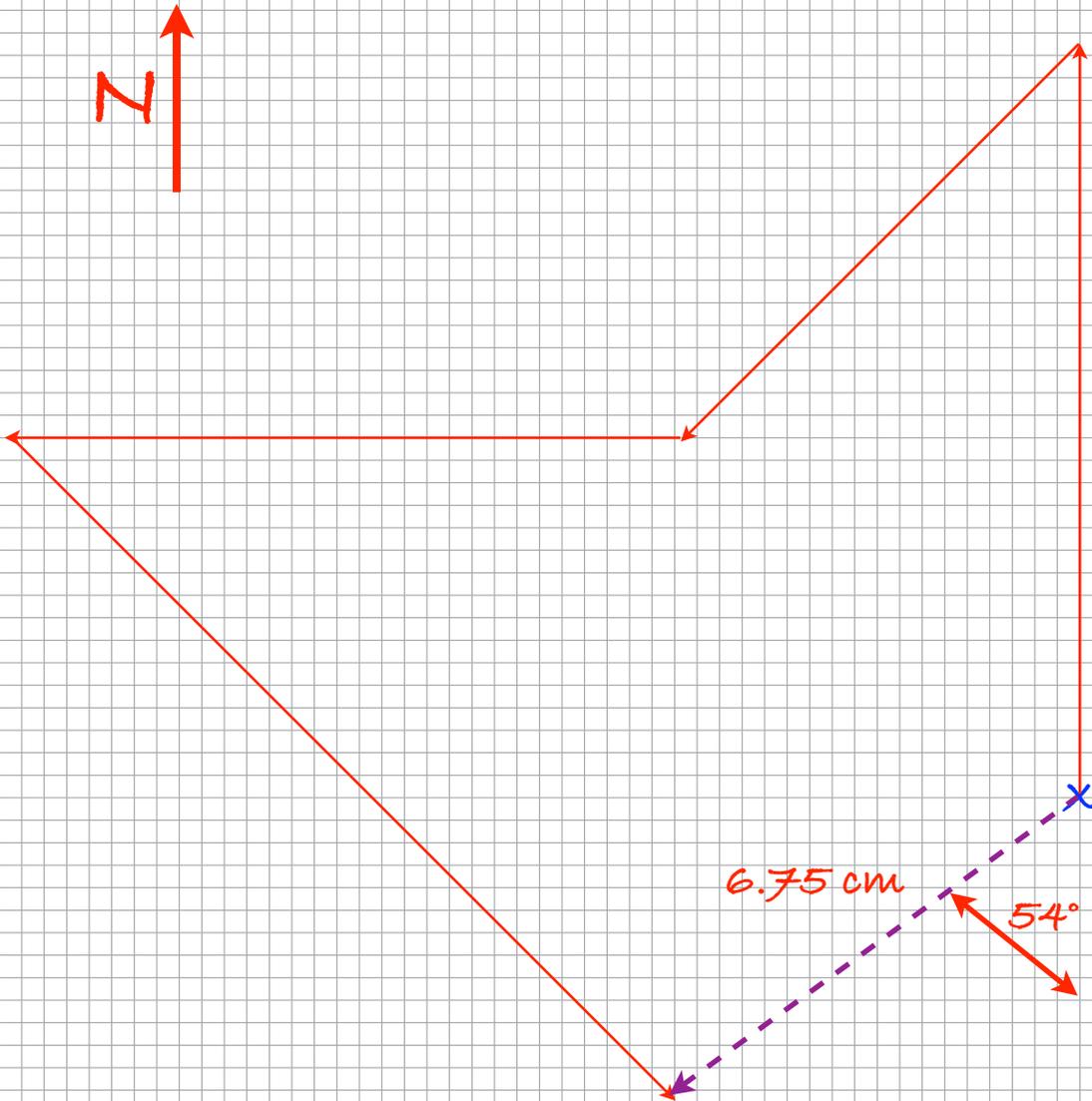
Bumbling Beetles

A beetle walks 2.1 cm [N], 4.5 cm [NW], 1.6 cm [S], and 3.2 cm [SE]. Use a vector diagram to find the beetle's displacement.



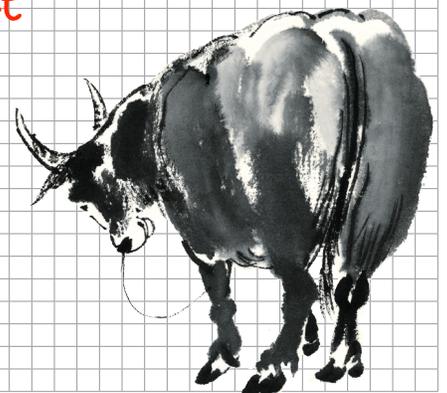
Wandering Water Buffalo

A water buffalo wanders 200 m [N], 150 m [SW], 180 m [W], and 250 m [SE]. Use a vector diagram to find the water buffalo's displacement.



The water buffalo's displacement was 135 m [S54°W].

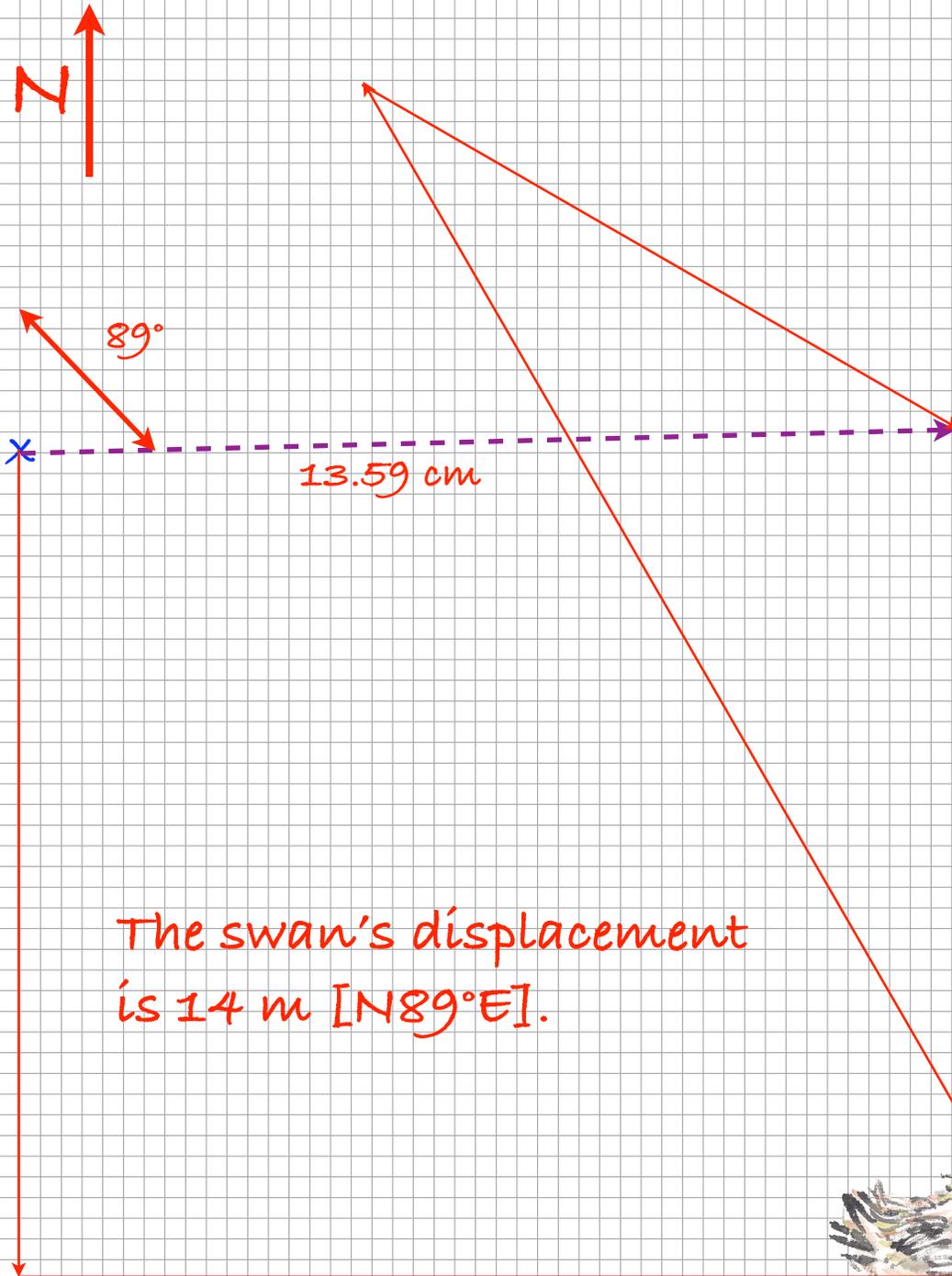
Scale: 1 cm = 20 m



Swimming Swans

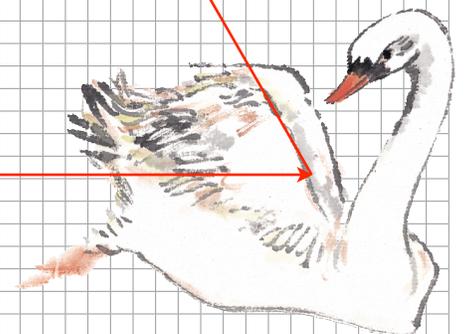
C

A swan swims 12 m [S], 15 m [E], 20 m [N30°W], and 10 m [S60°E]. Use a vector diagram to find the swan's displacement.



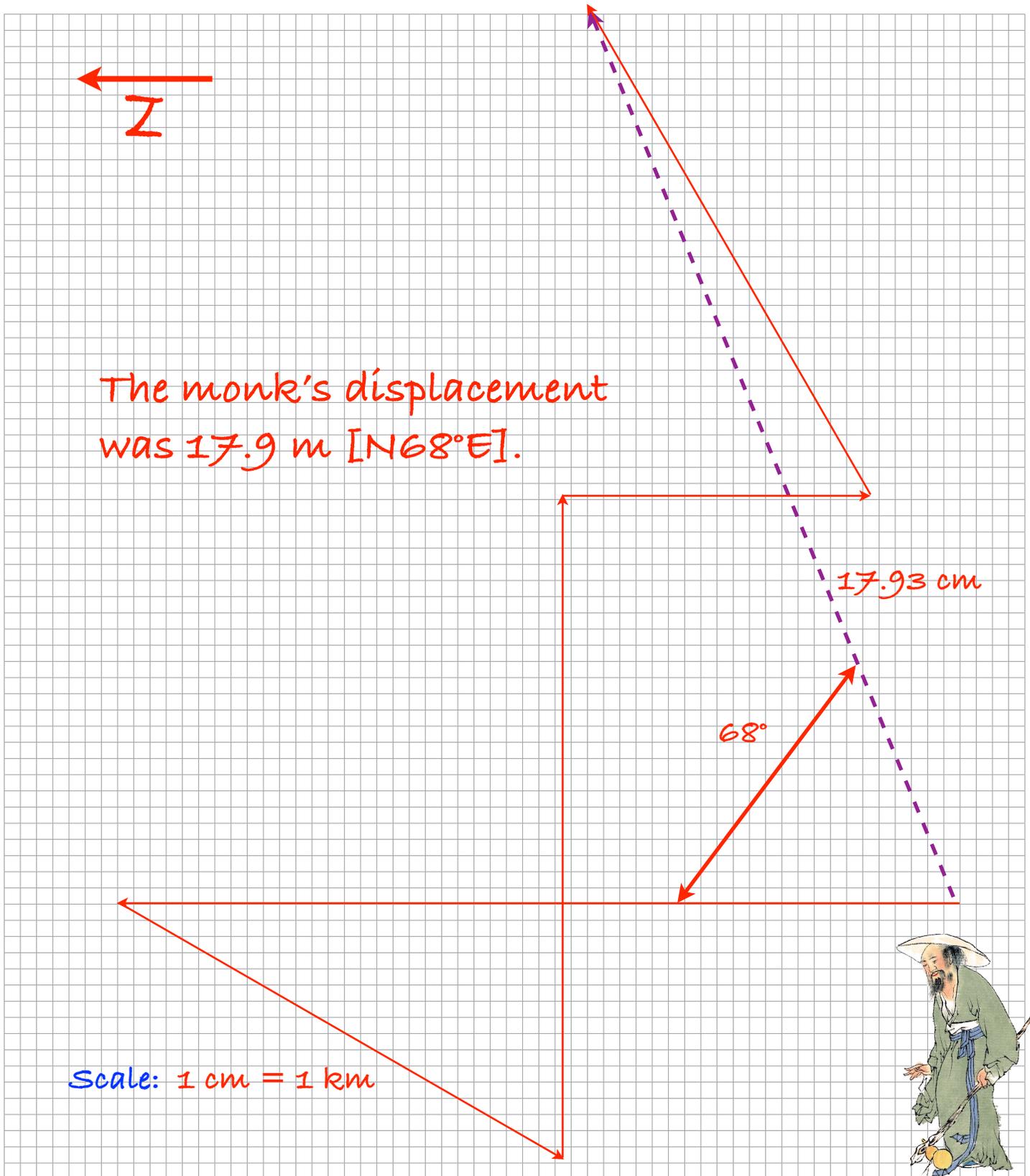
The swan's displacement
is 14 m [N89°E].

Scale: 1 cm = 1 m



Meandering Monks

A monk walks 15.6 km [N], 9.5 km [S30°W], 12.3 km [E], 5.7 km [S], and 10.5 km [N60°E]. Use a vector diagram to find the monk's displacement.



Creeping Cricket

c

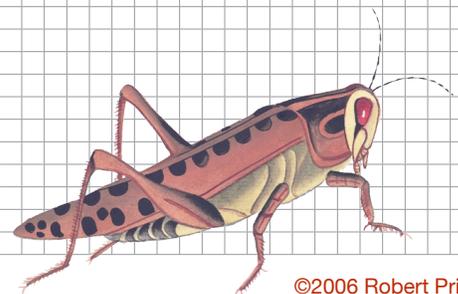
A cricket creeps 1.2 m [S], 0.8 m [30° S of W], 0.5 m [15° W of N], 0.4 m [E], and 0.8 m [25° E of N]. Use a vector diagram to find the cricket's displacement.



The cricket's displacement is 0.4 m [S12°W].

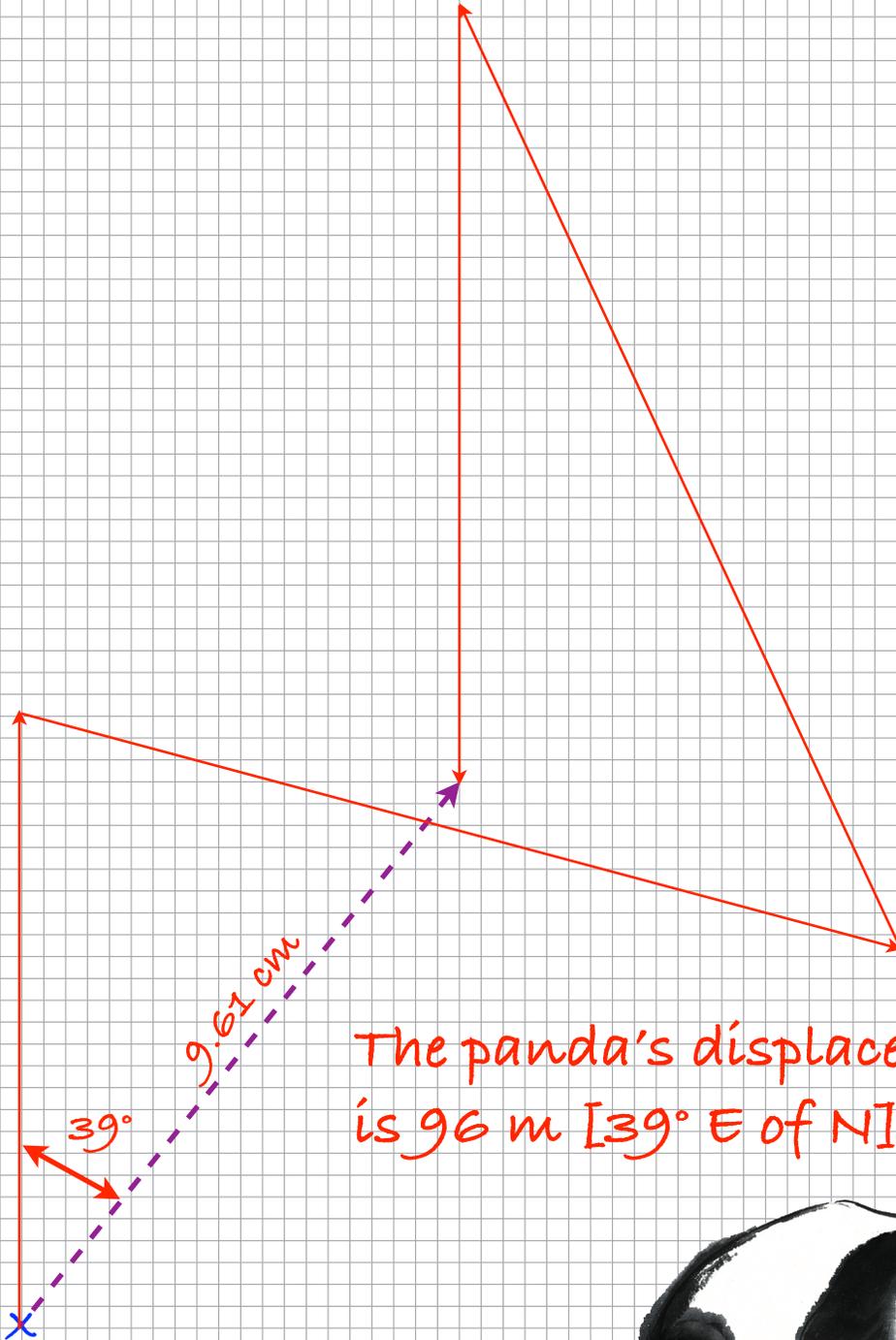
4.12 cm
11.5°

Scale: 1 cm = 0.1 m



Perambulating Pandas

A panda walks 85 m [N], 125 m [15° S of E], 143 m [25° W of N], and 107 m [S]. Use a vector diagram to find the panda's displacement.



The panda's displacement is 96 m [39° E of N].

Scale: 1 cm = 10 m

