

# Kinematics



Grade 11 Physics

## 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

2

## 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.

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### Easy Problems

The problems have vectors at right angles and at  $45^\circ$  to each other. They are easy to draw.

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### More Challenging Problems

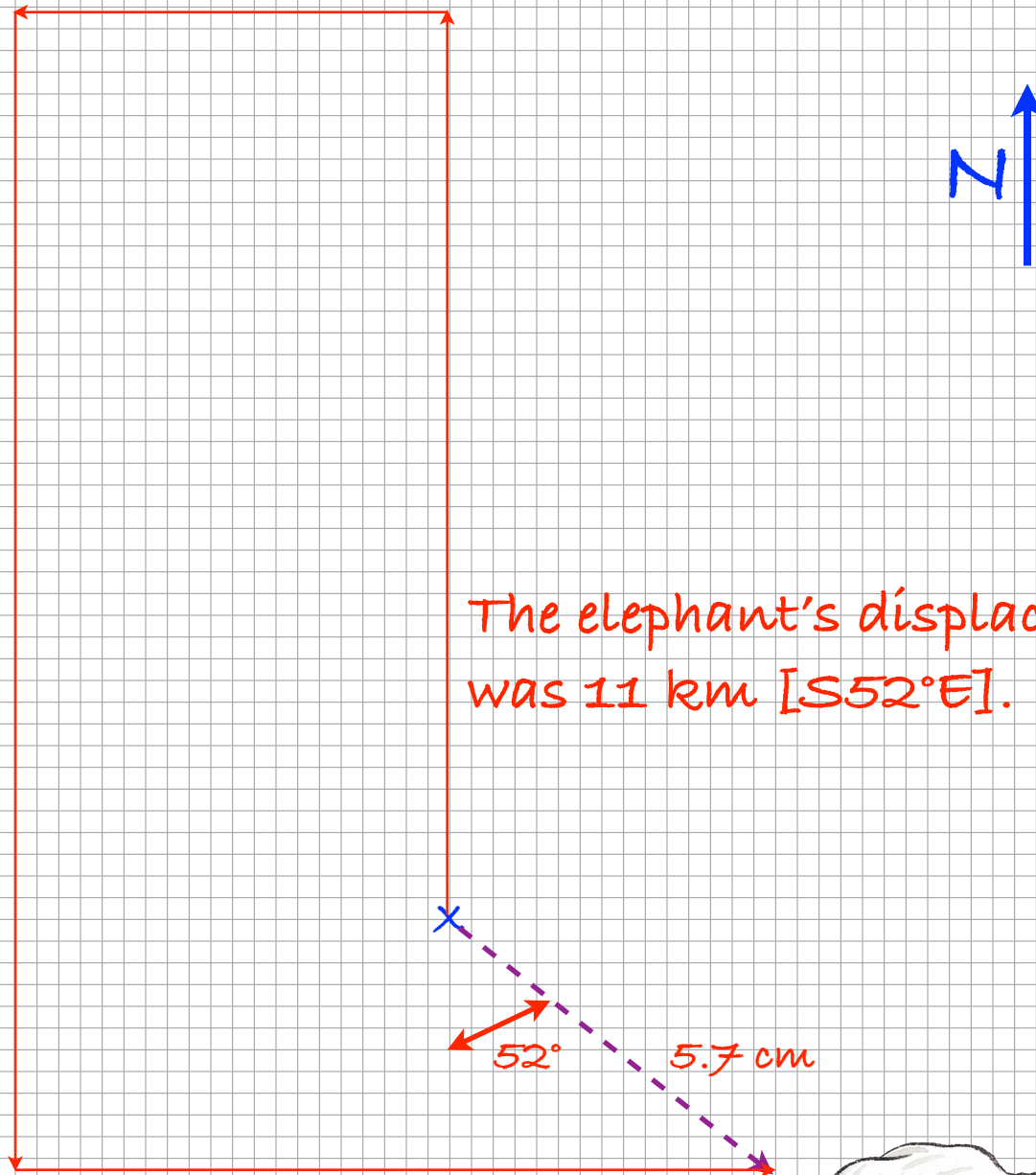
The problems have vectors at many different angles to each other. They are more challenging to draw.

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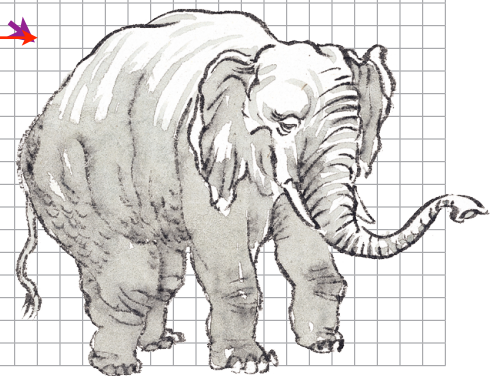
# Perambulating Pachyderm

A

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.



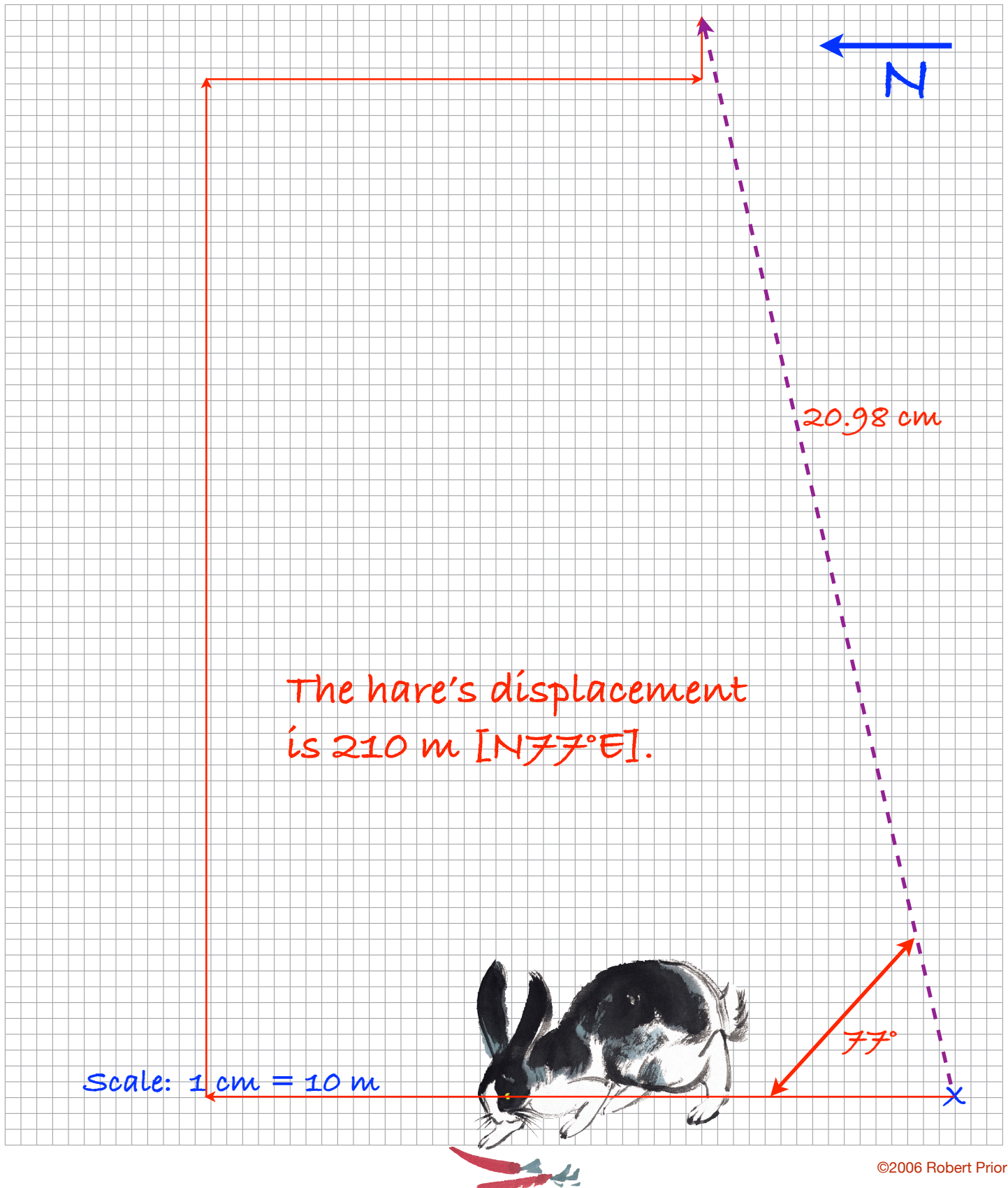
Scale: 1 cm = 2 km



# 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

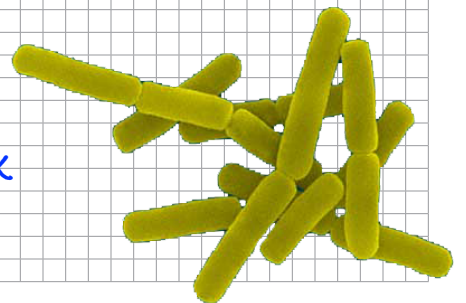
An anthrax bacillus moves  $135\text{ }\mu\text{m}$  [up],  $65\text{ }\mu\text{m}$  [left],  $52\text{ }\mu\text{m}$  [up],  $48\text{ }\mu\text{m}$  [left], and  $34\text{ }\mu\text{m}$  [down]. Use a vector diagram to find the anthrax bacillus' displacement.

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

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

up ↑

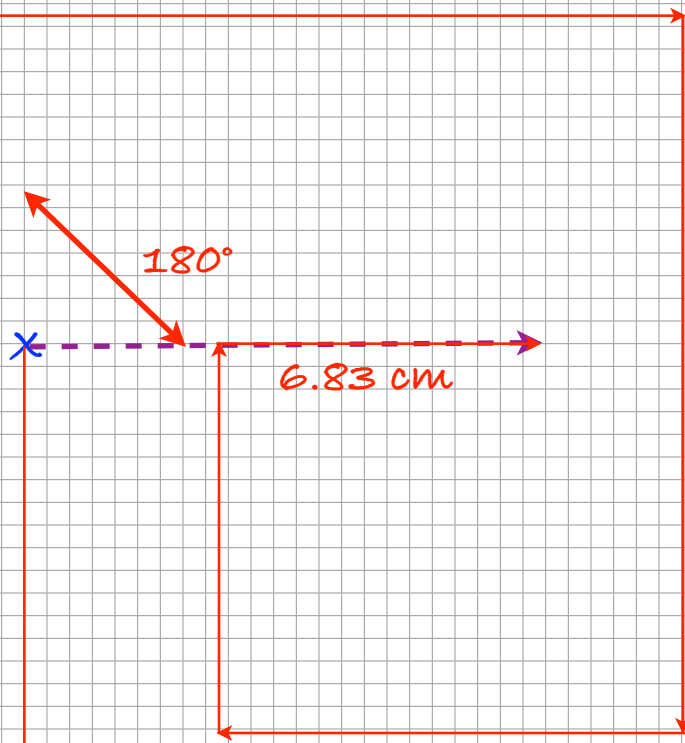
$36^\circ$



# Roaming Roosters

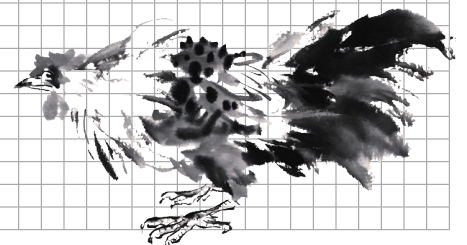
A

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.



The rooster's displacement is 6.8

Scale: 1 cm = 1 m

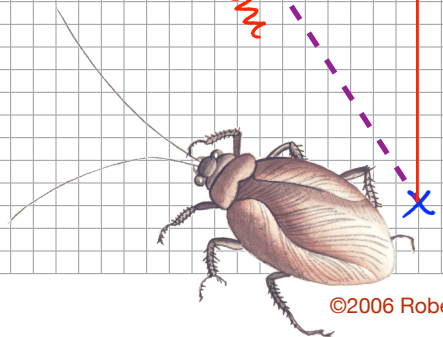


# Bumbling Beetles

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.

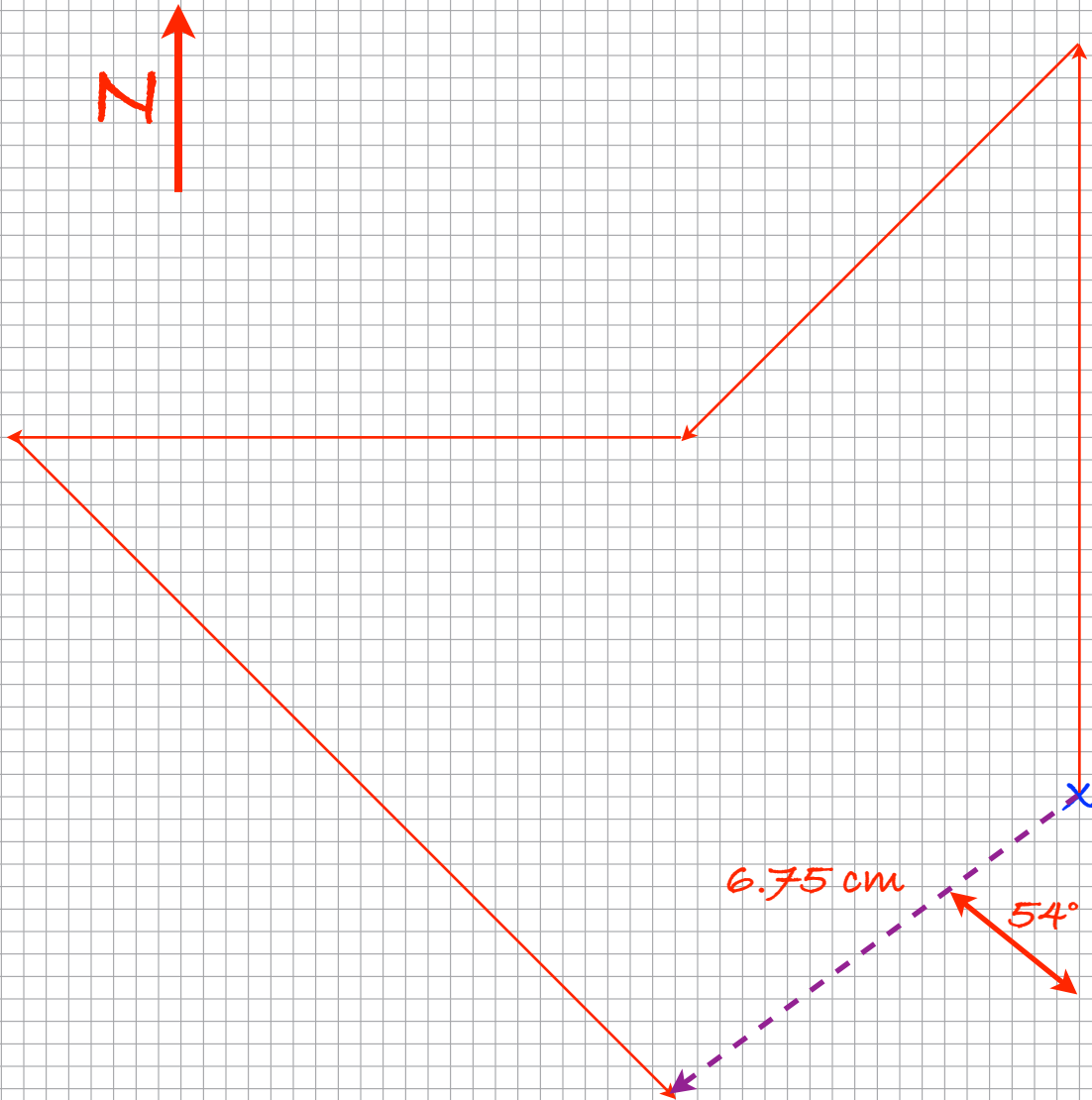
The beetle's displacement is 1.7 m [N33°W].

Scale: 4 cm (scale) = 1 cm (actual)



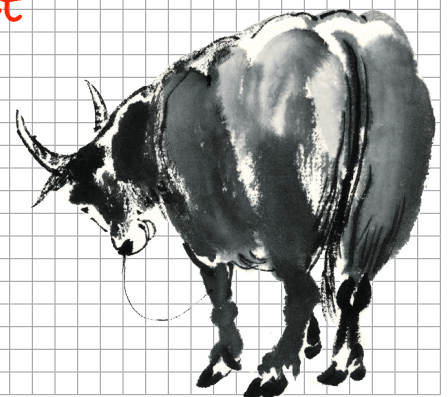
## Wandering Water Buffalo

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

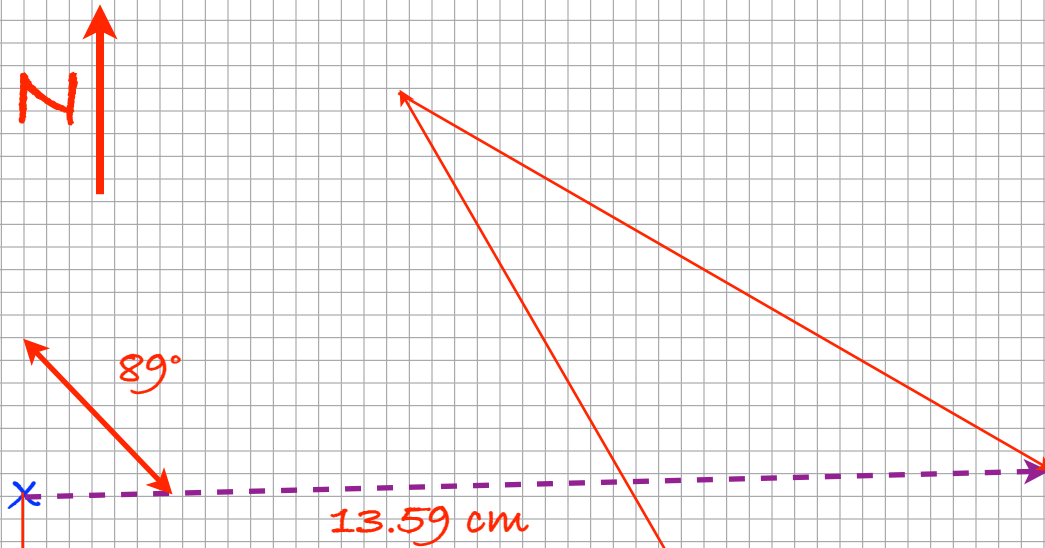




# Swimming Swans

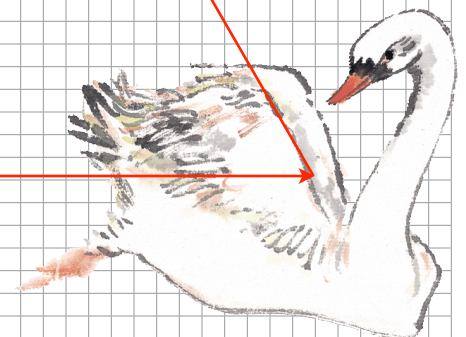
C

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.



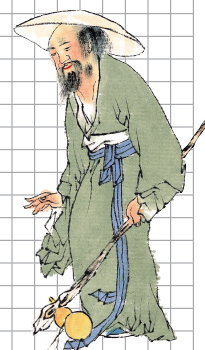
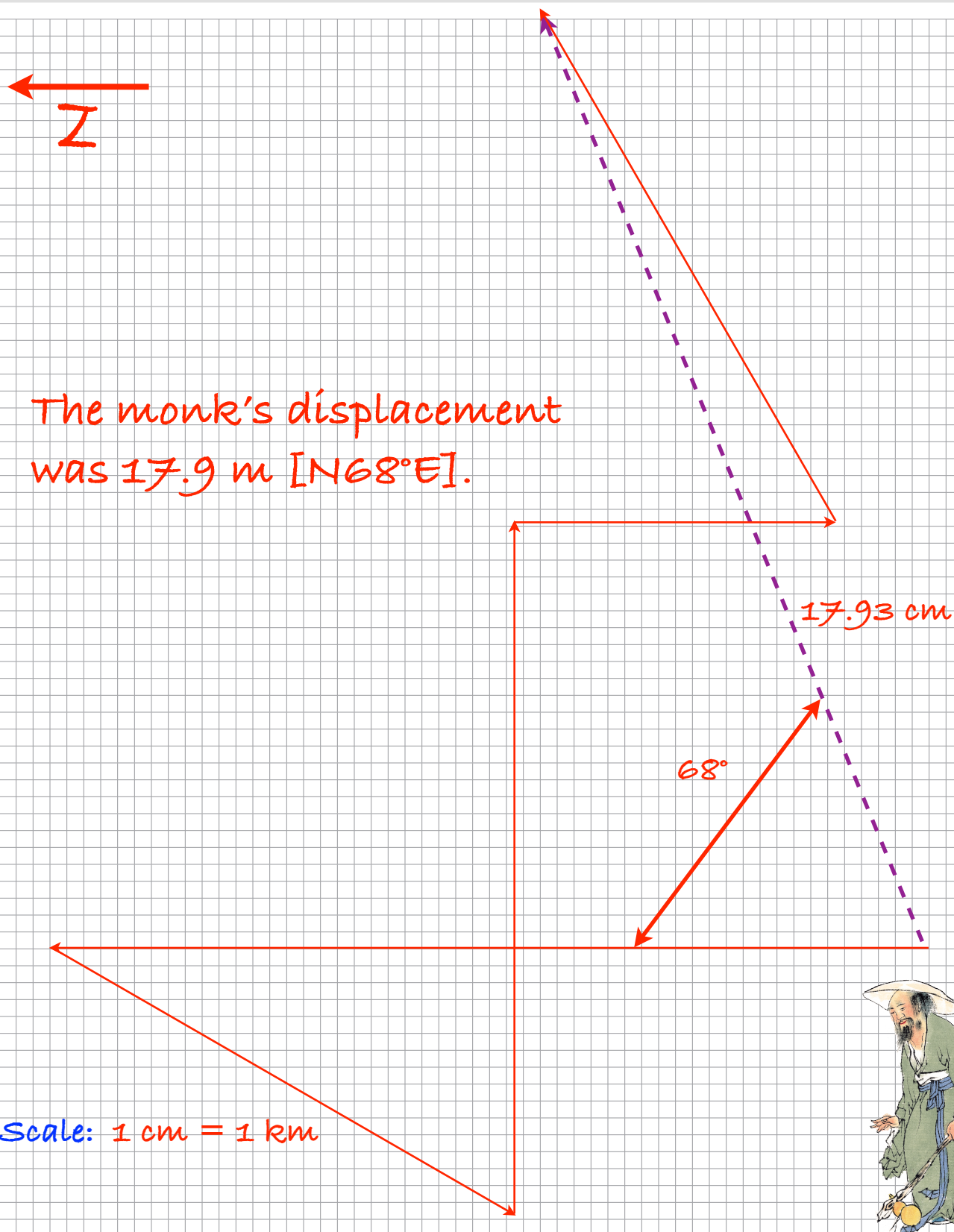
The swan's displacement  
is 14 m [N89°E].

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.

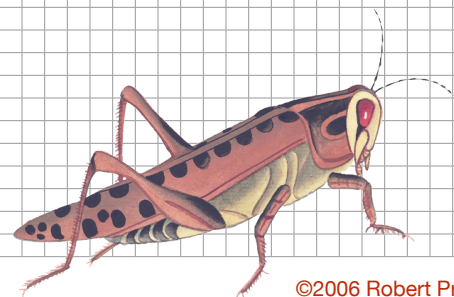


The cricket's displacement is 0.4 m [S12°W].

4.12 cm

11.5°

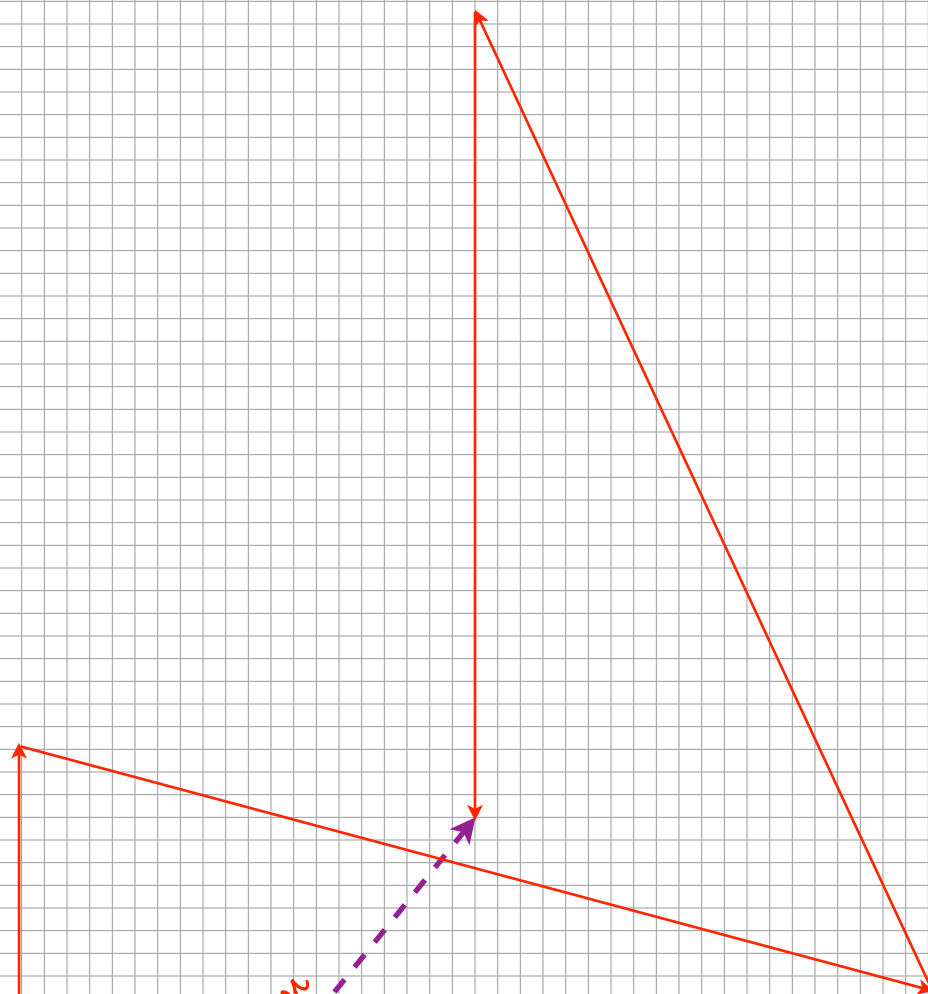
Scale: 1 cm = 0.1 m



# Perambulating Pandas

C

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



The panda's displacement is 96 m [ $39^\circ$  E of N].

Scale: 1 cm = 10 m

