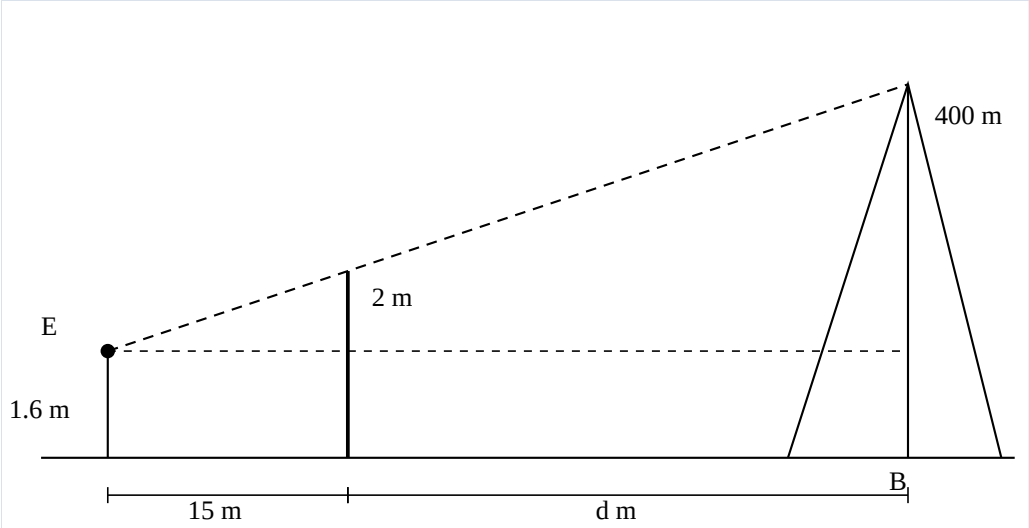
Similar Triangles & Sightlines

Practice Worksheet (Problem Solving)

I Do

Emma's eye level is at 1.6 m above the ground. She is looking at a mountain that she knows is 400 m tall. There is a 2 m tall pine tree between her and the mountain.

When she is standing 15 m away from the base of the tree, the top of the mountain is just hidden by the top of the pine tree. All measurements have been taken from level ground.



Not to scale. B is directly below the mountain top.

Calculate how far the mountain is from the other side of the tree.

Distance = ... m

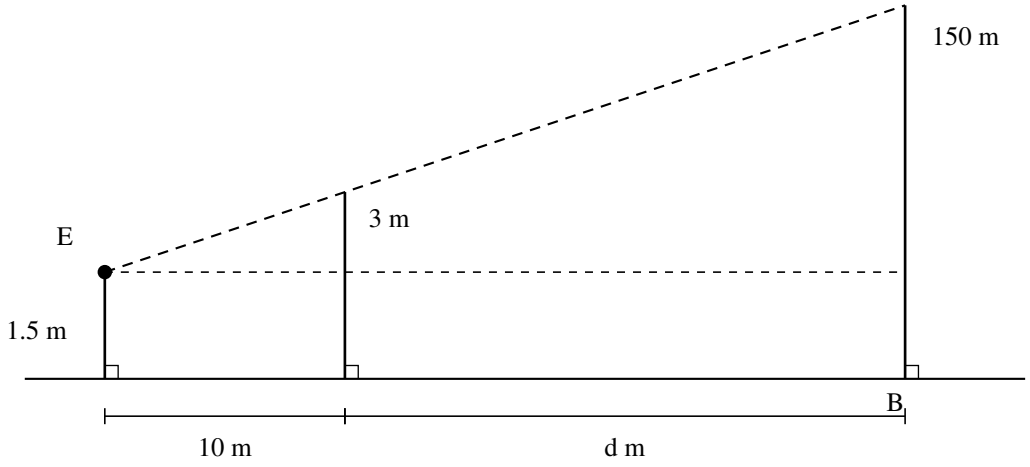
(4 marks)

Similar Triangles & Sightlines

Practice Worksheet (Problem Solving)

We Do

Tom's eye level is 1.5 m above the ground. He is looking at a skyscraper that is 150 m tall. A 3 m tall brick wall stands between him and the skyscraper. When Tom stands 10 m away from the wall, the top of the building is exactly hidden by the top of the wall. Calculate the distance from the other side of the wall to the skyscraper.



Not to scale. B is directly below the distant object's top.

Distance = ... m

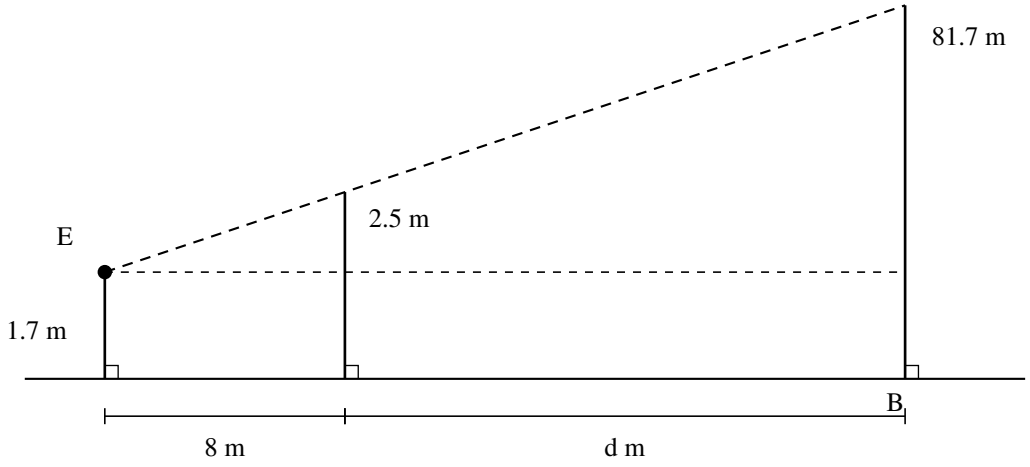
(4 marks)

Similar Triangles & Sightlines

Practice Worksheet (Problem Solving)

You Do 1

Catherine's eye level is 1.7 m. She looks at a radio tower that is 81.7 m tall. A 2.5 m high fence is between her and the tower. When she stands 8 m away from the fence, the top of the tower aligns perfectly with the top of the fence. Calculate the distance from the fence to the base of the tower.



Not to scale. B is directly below the distant object's top.

Distance = ... m

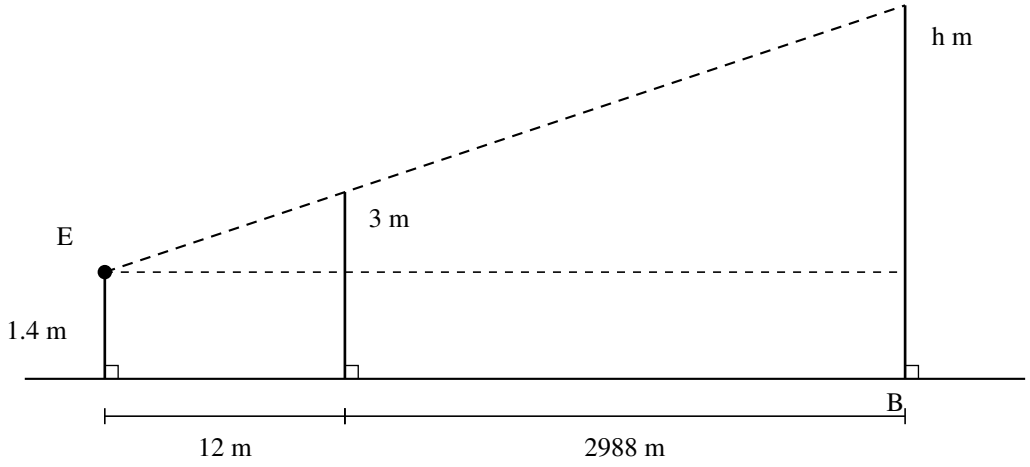
(4 marks)

Similar Triangles & Sightlines

Practice Worksheet (Problem Solving)

You Do 2

John's eye level is 1.4 m. He is looking at a distant cliff. A 3 m tall tree is between him and the cliff. John is 12 m from the tree, and the tree is 2988 m from the cliff. The top of the cliff aligns exactly with the top of the tree from John's perspective. Calculate the total height of the cliff.



Not to scale. B is directly below the distant object's top.

Height = ... m

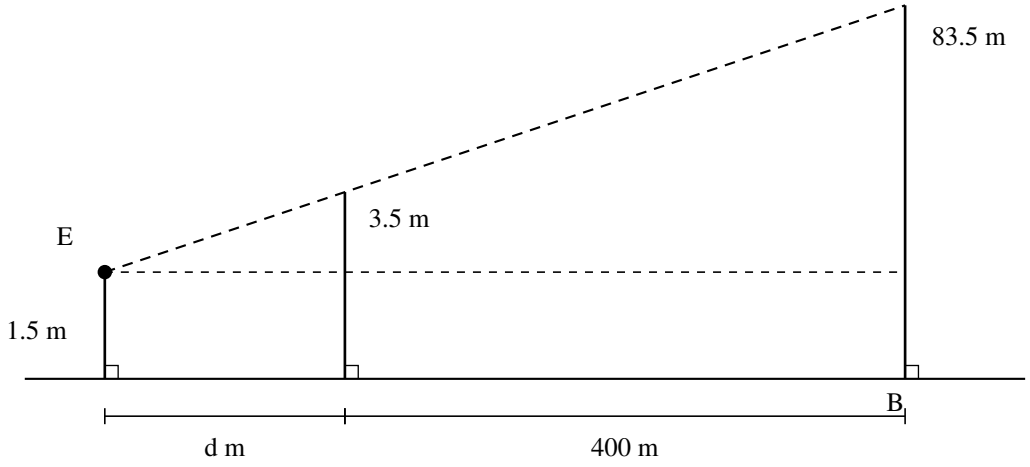
(4 marks)

Similar Triangles & Sightlines

Practice Worksheet (Problem Solving)

You Do 3

Ryan's eye level is 1.5 m. He looks at a wind turbine that is 83.5 m tall. He positions himself so that a 3.5 m tall lamp post exactly covers the top of the turbine. The lamp post is 400 m away from the wind turbine. How far is Ryan standing from the base of the lamp post?



Not to scale. B is directly below the distant object's top.

Distance = ... m

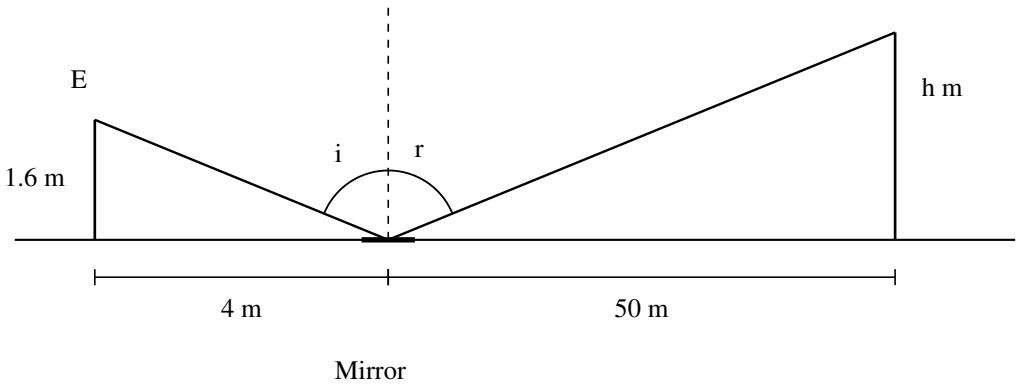
(4 marks)

Similar Triangles & Sightlines

Practice Worksheet (Problem Solving)

Challenge 1

Paul stands on level ground. His eye level is 1.6 m. He places a small mirror on the ground 4 m in front of him. When he looks at the mirror, he can just see the top of a tall building reflected in it. The mirror is 50 m away from the base of the building. Using the fact that the angle of incidence equals the angle of reflection (creating similar triangles), calculate the height of the building.



Not to scale. Angles at the mirror satisfy i = r.

Height = ... m

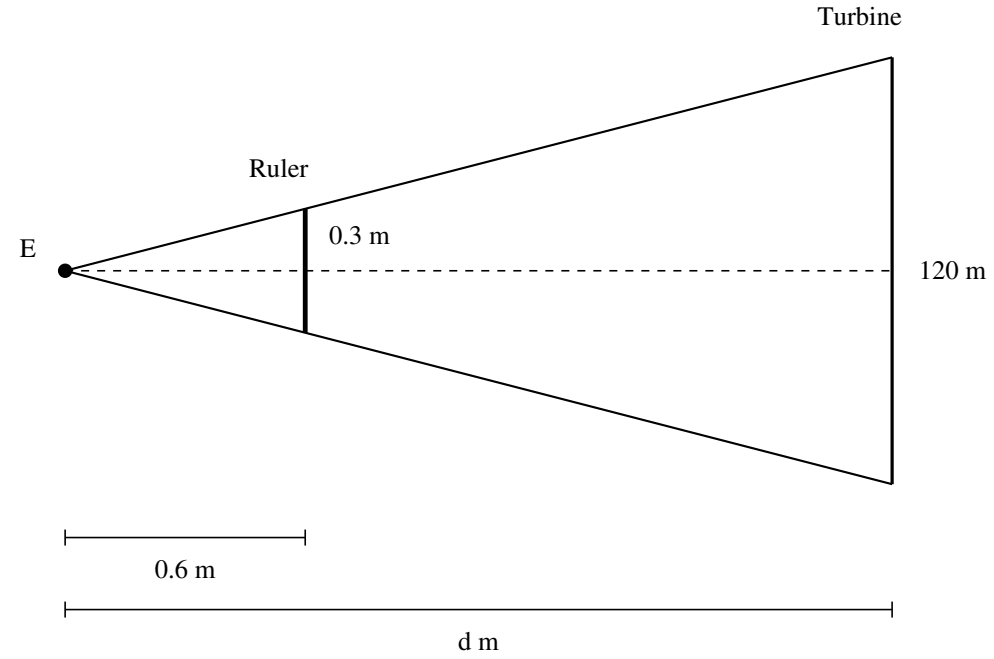
(4 marks)

Similar Triangles & Sightlines

Practice Worksheet (Problem Solving)

Challenge 2

Sophie holds a 30 cm (0.3 m) ruler vertically at arm's length. The ruler is exactly 60 cm (0.6 m) from her eye. She notices that the top and bottom of the ruler align perfectly with the top and bottom of a distant wind turbine. Sophie knows the wind turbine is 120 m tall. Calculate how far Sophie is from the wind turbine.



Not to scale. Both top and bottom edges align.

Distance = ... m

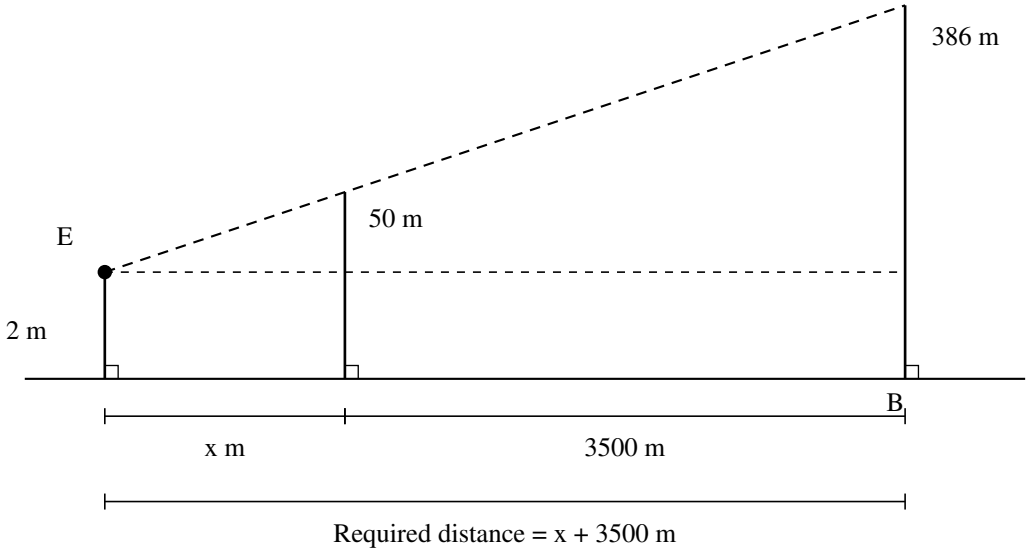
(4 marks)

Similar Triangles & Sightlines

Practice Worksheet (Problem Solving)

Extreme Challenge

Katie's eye level is 2 m above the ground. She is looking towards a hill and a much taller mountain directly behind it. The hill is 50 m tall, and the mountain is 386 m tall. Katie stands at a distance where the top of the hill perfectly aligns with the top of the mountain. If the horizontal distance from the hill to the mountain is 3500 m, calculate Katie's horizontal distance from the mountain.



Not to scale. B is directly below the distant object's top.

Distance = ... m

(5 marks)

Similar Triangles & Sightlines

Practice Worksheet (Problem Solving)

Worked Answers

I Do

Height of tree above eye level = 2 - 1.6 = 0.4 m. Height of mountain above eye level = 400 - 1.6 = 398.4 m. The ratio of the heights is 398.4 ÷ 0.4 = 996. Therefore, the total distance from Emma to the mountain is 996 × 15 = 14940 m. The distance from the tree to the mountain is 14940 - 15 = 14925 m.

We Do

Height of wall above eye level = 3 - 1.5 = 1.5 m. Height of building above eye level = 150 - 1.5 = 148.5 m. Ratio = 148.5 ÷ 1.5 = 99. Total distance to building = 10 × 99 = 990 m. Distance from wall to building = 990 - 10 = 980 m.

You Do 1

Fence above eye level = 2.5 - 1.7 = 0.8 m. Tower above eye level = 81.7 - 1.7 = 80 m. Ratio = 80 ÷ 0.8 = 100. Total distance to tower = 8 × 100 = 800 m. Distance from fence to tower = 800 - 8 = 792 m.

You Do 2

Total distance to cliff = 12 + 2988 = 3000 m. Ratio of distances = 3000 ÷ 12 = 250. Height of tree above eye level = 3 - 1.4 = 1.6 m. Height of cliff above eye level = 1.6 × 250 = 400 m. Total cliff height = 400 + 1.4 = 401.4 m.

Similar Triangles & Sightlines

Practice Worksheet (Problem Solving)

Worked Answers

You Do 3

Post above eye level = 3.5 - 1.5 = 2 m. Turbine above eye level = 83.5 - 1.5 = 82 m. Ratio = 82 ÷ 2 = 41. Total distance = 41 × (distance to post). Let distance to post be d. So, d + 400 = 41d. 400 = 40d, which means d = 10 m.

Challenge 1

The triangle from Paul's eye to the mirror is similar to the triangle from the building's top to the mirror. Ratio of distances = 50 ÷ 4 = 12.5. Building height = 1.6 × 12.5 = 20 m.

Challenge 2

The ratio of the ruler's height to the distance from Sophie's eye is 0.3 ÷ 0.6 = 0.5. By similar triangles, the ratio of the turbine's height to its distance must also be 0.5. Distance = 120 ÷ 0.5 = 240 m.

Extreme Challenge

Hill above eye level = 50 - 2 = 48 m. Mountain above eye level = 386 - 2 = 384 m. Ratio = 384 ÷ 48 = 8. Let distance to hill be d. Distance to mountain = d + 3500. So, d + 3500 = 8d. 7d = 3500, meaning d = 500 m. Katie's total distance to the mountain = 500 + 3500 = 4000 m.