

Using measurement tools — Solutions



Worked answers showing the ruler subtraction or the correct protractor scale for each problem.

Name _____

Date _____

Solution method

For a ruler, subtract the start reading from the end reading. For a protractor, read from the scale that matches the stated zero line – outer from the right, inner from the left. Answers are shown to the required accuracy.

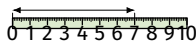
Worked example An object is measured against a ruler. Find its length.

The span runs from 2 cm to 9 cm.

$$\text{Length} = 9 - 2 = 7 \text{ cm}$$



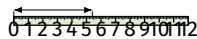
1. Read the length shown, in centimetres.



Solution

$$7 - 0 = 7 \text{ cm}$$

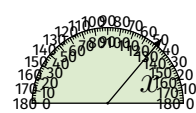
2. Read the length shown, in millimetres.



Solution

$$5.4 - 0 = 5.4 \text{ cm} = 54 \text{ mm}$$

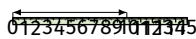
3. Read the marked angle from the outer scale.



Solution

$$x = 50^\circ$$

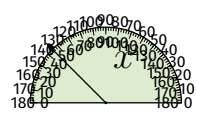
4. Read the length shown, in millimetres.



Solution

$$9.8 - 0 = 9.8 \text{ cm} = 98 \text{ mm}$$

5. Read the marked angle from the outer scale.



Solution

$$x = 135^\circ$$

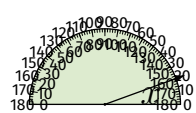
6. The object does not start at zero. Find its length in centimetres.



Solution

$$8 - 3 = 5 \text{ cm}$$

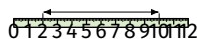
7. Read the marked angle from the outer scale.



Solution

$$x = 20^\circ$$

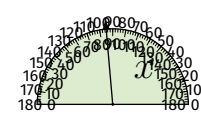
8. The object does not start at zero. Find its length in centimetres.



Solution

$$10 - 2 = 8 \text{ cm}$$

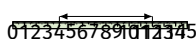
9. Read the marked angle from the outer scale.



Solution

$$x = 95^\circ$$

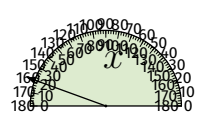
10. The object does not start at zero. Find its length in centimetres.



Solution

$$12 - 4 = 8 \text{ cm}$$

11. Read the marked angle from the outer scale.



Solution

$$x = 160^\circ$$

12. Read the length shown, in millimetres.



Solution

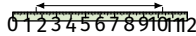
$$9.5 - 1 = 8.5 \text{ cm} = 85 \text{ mm}$$



Name _____

Date _____

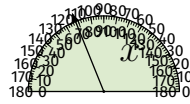
13. Read to the nearest millimetre. Give the length in millimetres.



Solution

$$10.3 - 1.6 = 8.7 \text{ cm} = 87 \text{ mm}$$

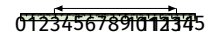
14. Measure from the left-hand zero line (inner scale).



Solution

$$x = 180 - 112 = 68^\circ$$

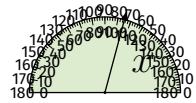
15. Read to the nearest millimetre. Give the length in millimetres.



Solution

$$13.4 - 2.9 = 10.5 \text{ cm} = 105 \text{ mm}$$

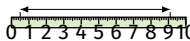
16. Read the marked angle from the outer scale.



Solution

$$x = 75^\circ$$

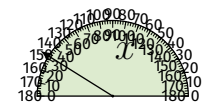
17. Read to the nearest millimetre. Give the length in millimetres.



Solution

$$9.1 - 0.5 = 8.6 \text{ cm} = 86 \text{ mm}$$

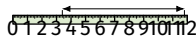
18. Measure from the left-hand zero line (inner scale).



Solution

$$x = 180 - 148 = 32^\circ$$

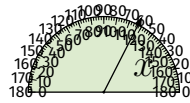
19. Read to the nearest millimetre. Give the length in millimetres.



Solution

$$11.8 - 3.4 = 8.4 \text{ cm} = 84 \text{ mm}$$

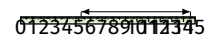
20. Read the marked angle from the outer scale.



Solution

$$x = 63^\circ$$

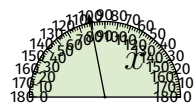
21. Give the length to the nearest whole centimetre.



Solution

$$14.6 - 5.2 = 9.4 \text{ cm} \rightarrow 9 \text{ cm}$$

22. Read from the outer scale. Is this angle acute or obtuse?



Solution

$$x = 101^\circ, \text{ obtuse}$$

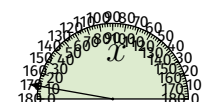
23. Read to the nearest millimetre. Give the length in millimetres.



Solution

$$9.9 - 2.3 = 7.6 \text{ cm} = 76 \text{ mm}$$

24. Read from the outer scale. How many degrees short of a straight angle (180°) is it?



Solution

$$x = 170^\circ; 180 - 170 = 10^\circ \text{ short}$$

25. A ray on a protractor is read as 55° on the outer scale. State its reading on the inner scale, and explain why the two scales always add to 180° .

Solution

$$180 - 55 = 125^\circ \text{ (opposite ends of one straight baseline).}$$

26. One student reads a ruler straight off the end position and gets 9 cm. A second student subtracts the object's start position and gets 6.5 cm. Explain the first student's mistake.

Solution

The object did not start at zero. Ignoring the start over-counts the length.

27. Explain why a protractor has two number scales instead of just one.

Solution

A ray can open from either baseline. Outer counts from the right zero, inner from the left zero.