

Rational and Irrational Numbers: math test solutions, Grade 8 – download the PDF

Test solutions with the detailed point scale. Add up your points and spot what to review.

Suggested time: 45 minutes. Out of 20 points. Calculator allowed only when the problem says so.

1 Classify the numbers

/ 4 pts

$-\frac{9}{4}$: rational (0.5 pt). $\sqrt{64} = 8$: rational (0.5 pt). $\sqrt{45}$: irrational (0.5 pt). $0.\overline{27} = \frac{3}{11}$: rational (0.5 pt). 5π : irrational (0.5 pt). $0.3030030003\dots$: irrational, the zeros keep growing so nothing repeats (0.5 pt).

Explanation: $6^2 = 36 < 45 < 49 = 7^2$, so $\sqrt{45}$ lies strictly between 6 and 7 and is not an integer (1 pt).

2 Repeating decimals

/ 4 pts

a) $x = 0.1515\dots$, $100x = 15.1515\dots$ (1 pt). $99x = 15$ (0.5 pt), so $x = \frac{15}{99} = \frac{5}{33}$ (0.5 pt).

b) $x = 0.7222\dots$, $100x = 72.222\dots$ and $10x = 7.222\dots$ (1 pt). $90x = 65$ (0.5 pt), so $x = \frac{65}{90} = \frac{13}{18}$ (0.5 pt).

3 Roots and equations

/ 4 pts

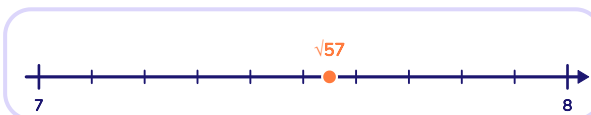
a) **13** (0.5 pt). b) **-6** because $(-6)^3 = -216$ (0.5 pt). c) $\frac{7}{8}$ (1 pt). d) $x = 11$ or $x = -11$ (1 pt, 0.5 pt per solution). e) $x = 0.3$ because $0.3^3 = 0.027$ (1 pt).

4 Estimating a root

/ 3 pts

a) $49 < 57 < 64$, so $7 < \sqrt{57} < 8$ (1 pt).

b) $7.5^2 = 56.25$ and $7.6^2 = 57.76$, so $7.5 < \sqrt{57} < 7.6$ (0.5 pt). The halfway point is **7.55**: $7.55^2 = 57.0025 > 57$, so $\sqrt{57} < 7.55$ (1 pt). Therefore $\sqrt{57} \approx 7.5$ (0.5 pt).



5 Order the numbers

/ 3 pts

Decimals: $-\sqrt{10} \approx -3.162$ (1 pt), -3.2 , $-\pi \approx -3.1416$, $-\frac{10}{3} = -3.333\dots$, -3.1 (1 pt).

Order:

$$-\frac{10}{3} < -3.2 < -\sqrt{10} < -\pi < -3.1$$

(1 pt).

6 The rug

/ 2 pts

a) Side = $\sqrt{30} \approx 5.477$, so about **5.5** ft (1 pt).

b) **30** is not a perfect square ($5^2 = 25$, $6^2 = 36$), so $\sqrt{30}$ is irrational (1 pt).



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