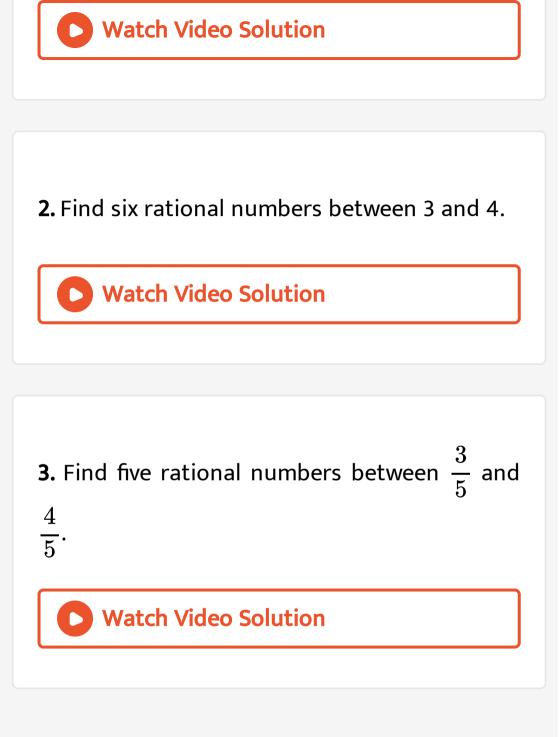# MATHS

BOOKS - PSEB

NUMBER SYSTEMS

Exercise

1. Is zero a rational number ? Can you write in the form $\dfrac{p}{q}$ where p and q are integers and $q \neq 0$?

2. Find six rational numbers between 3 and 4.

3. Find five rational numbers between $\dfrac{3}{5}$ and $\dfrac{4}{5}$.

4. State whether the following statements are true or false. Give reasons for your answers:- Every natural number is a whole number.

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5. State whether the following statements are true or false. Give reasons for your answers:- Every integer is a whole number.

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6. Are the following statement true or false ? Justify the answer : Every rational number is a whole number.

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7. Are the following statement true and false ? Justify your answer. Every irrational number is a real number.

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8. Are the following statement true and false ? Justify your answer. Every point on the number line is of the form $\sqrt{m}$, where m is a natural number.

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9. Are the following statement true and false ? Justify your answer. Every real number is a irrational number.

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10. Are the square root of all positive integers irrational ? If no, give an example of the square root of a number that is a rational numebr.

11. Represent the real number $\sqrt{13}$ on the number line.

12. Write the following in decimal form and say what kind of decimal expansion each has :

$$\frac{36}{100}$$

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13. Write the following in decimal form and say what kind of decimal expansion each has : $\frac{1}{11}$

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14. Write the following in decimal form and say what kind of decimal expansion each has : $4\dfrac{1}{8}$

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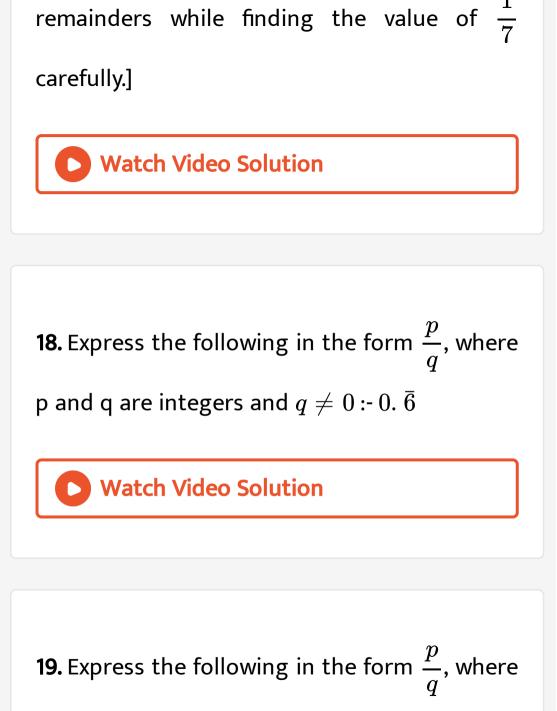**15.** Write the following in decimal form and say what kind of decimal expansion each has : $\dfrac{2}{11}$
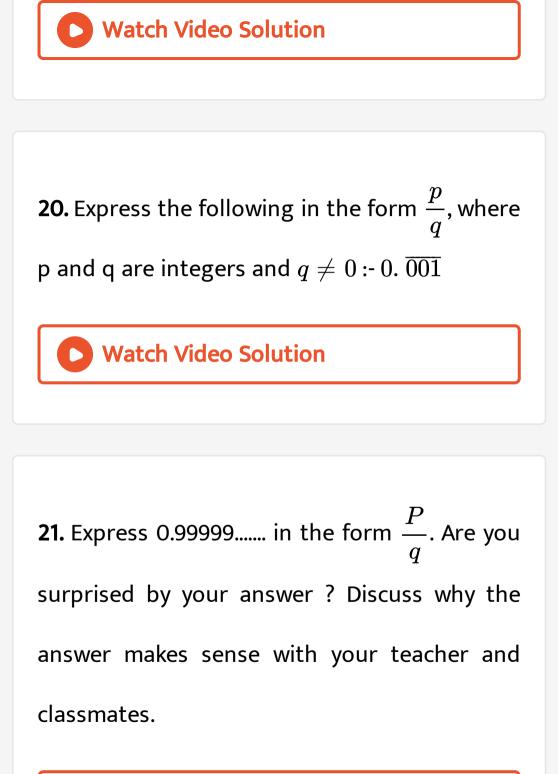
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16. Write the following in decimal form and say what kind of decimal expansion each has :

$$\frac{329}{400}$$

17. You know that $\frac{1}{7} = 0.\overline{142857}$ Can you predict what the decimal expansions of $\frac{2}{7}, \frac{3}{7}, \frac{4}{7}, \frac{5}{7}, \frac{6}{7}$ are, without actually doing the long division? If so, how? [Hint : Study the

remainders while finding the value of $\frac{1}{7}$ carefully.]

18. Express the following in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$:- $0.\bar{6}$

19. Express the following in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$:- $0.4\bar{7}$

20. Express the following in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$:- $0.\overline{001}$

21. Express 0.99999....... in the form $\frac{P}{q}$. Are you surprised by your answer ? Discuss why the answer makes sense with your teacher and classmates.

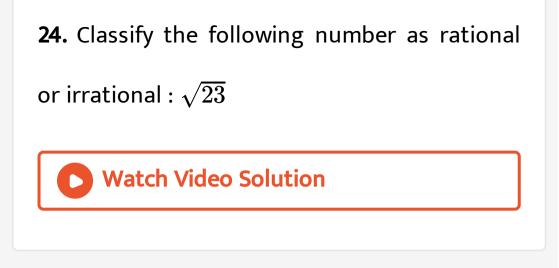**22.** Write three numbers whose decimal expansions are non-terminating non-recurring.

23. Find three different irrational numbers between the rational numbers $\dfrac{5}{7}$ and $\dfrac{9}{11}$.

24. Classify the following number as rational or irrational : $\sqrt{23}$

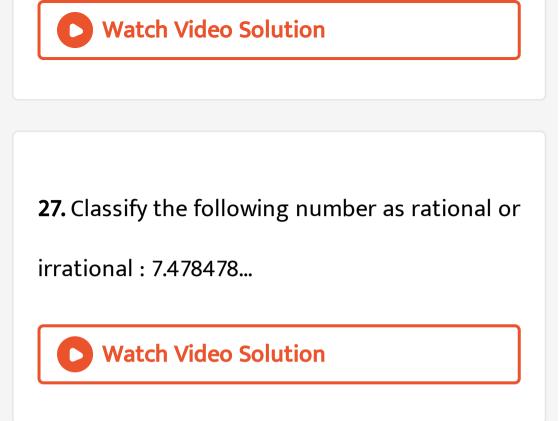▶ Watch Video Solution

25. Classify the following number as rational or irrational : $\sqrt{225}$

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26. Classify the following number as rational or irrational : 0.3796

27. Classify the following number as rational or irrational : 7.478478...

28. Classify the following number as rational or irrational : 1.101001000100001...

29. Visualise 3.765 on the number line, using successive magnification.

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30. Visualise $4.\overline{26}$ on the number line, up to 4 decimal places.
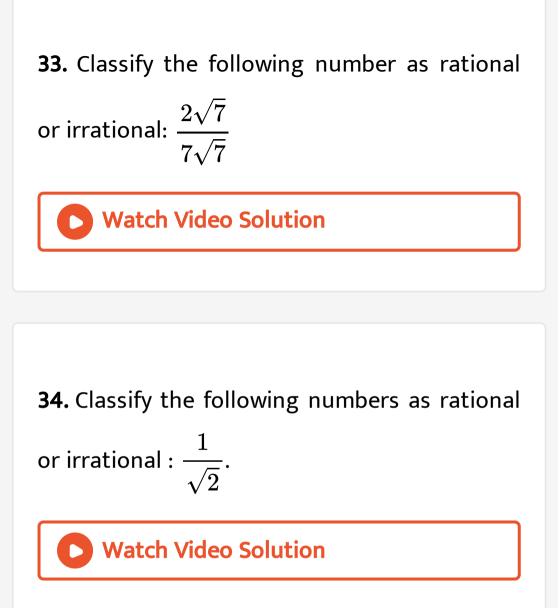
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31. Classify the following numbers as rational or irrational : $2 - \sqrt{5}$

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32. Classify the following numbers as rational or irrational : $\left(3 + \sqrt{23}\right) - \sqrt{23}.$

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33. Classify the following number as rational or irrational: $\dfrac{2\sqrt{7}}{7\sqrt{7}}$

34. Classify the following numbers as rational or irrational : $\dfrac{1}{\sqrt{2}}$.

35. Classify the following numbers as rational or irrational : 2π.

36. Simplify each of the following expressions:

$$\left(3 + \sqrt{3}\right)\left(2 + \sqrt{2}\right)$$

37. Simplify each of the following expressions:

$$\left(3 + \sqrt{3}\right)\left(3 - \sqrt{3}\right)$$

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38. Simplify each of the following expressions:

$$\left(\sqrt{5} + \sqrt{2}\right)^2$$
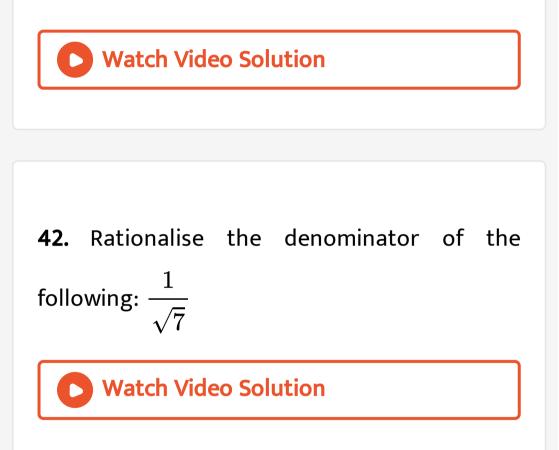
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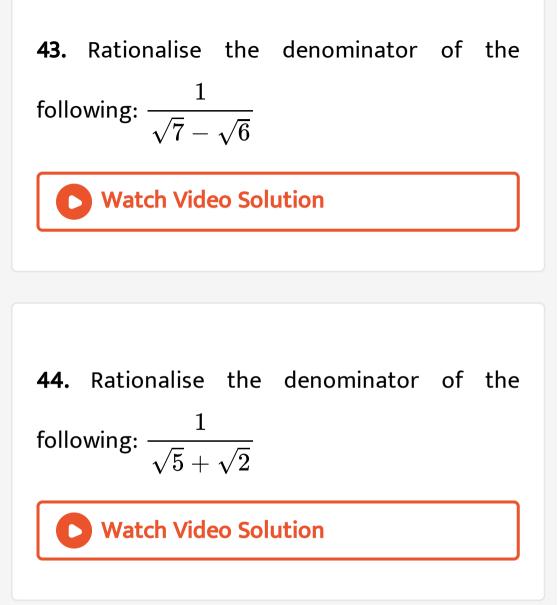**39.** Simplify each of the following expressions:

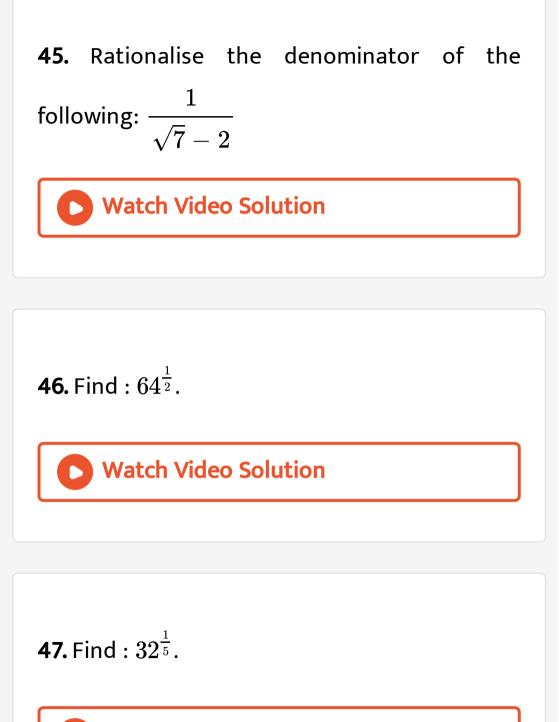$$\left(\sqrt{5} - \sqrt{2}\right)\left(\sqrt{5} + \sqrt{2}\right)$$

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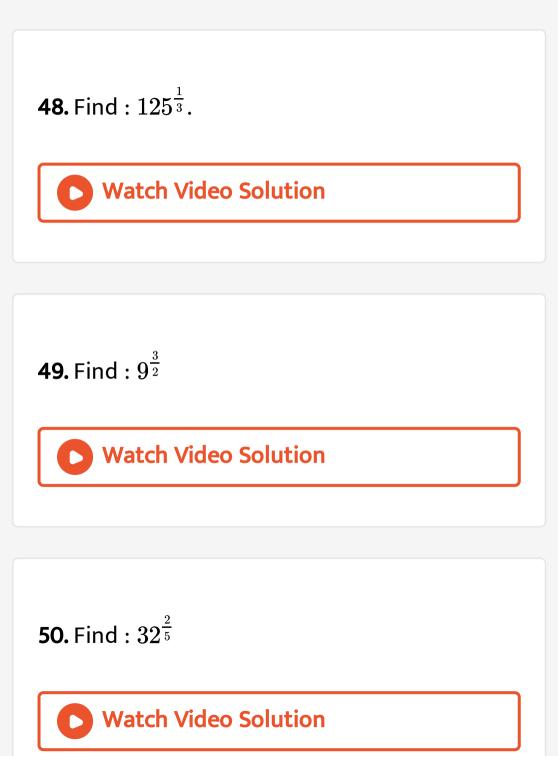**40.** Recall, π is defined as the ratio of the circumference (say c) of a circle to its diameter(say d). That is, $\pi = \dfrac{c}{d}$. This seems to contradict the fact that π is irrational. How will you resolve this contradiction?

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41. Represent $\sqrt{9.3}$ on the number line.

42. Rationalise the denominator of the following: $\dfrac{1}{\sqrt{7}}$

43. Rationalise the denominator of the following: $\dfrac{1}{\sqrt{7} - \sqrt{6}}$

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44. Rationalise the denominator of the following: $\dfrac{1}{\sqrt{5} + \sqrt{2}}$

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45. Rationalise the denominator of the following: $\dfrac{1}{\sqrt{7} - 2}$

46. Find : $64^{\frac{1}{2}}$.

47. Find : $32^{\frac{1}{5}}$.

48. Find : $125^{\frac{1}{3}}$.

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49. Find : $9^{\frac{3}{2}}$

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50. Find : $32^{\frac{2}{5}}$

▶ **Watch Video Solution**

51. Find : $16^{\frac{3}{4}}$.

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52. Find : $125^{-\frac{1}{3}}$

▶ **Watch Video Solution**

53. Simplify : $2^{\frac{2}{3}} \cdot 2^{\frac{1}{5}}$

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54. Simplify : $\left(\dfrac{1}{3^3}\right)^7$

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55. Simplify : $\dfrac{11^{\frac{1}{2}}}{11^{\frac{1}{4}}}$

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56. Simplify : $7^{\frac{1}{2}} \cdot 8^{\frac{1}{2}}$

Example

1. Is the following statement true of false? Give reasons for your answers.Every whole number is a natural number.

2. Is the following statement true of false? Give reasons for your answers. Every integer is

a rational number.
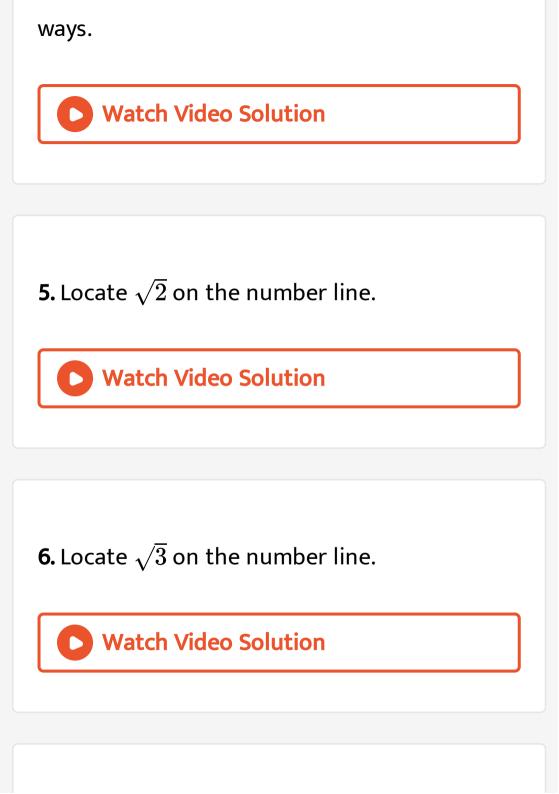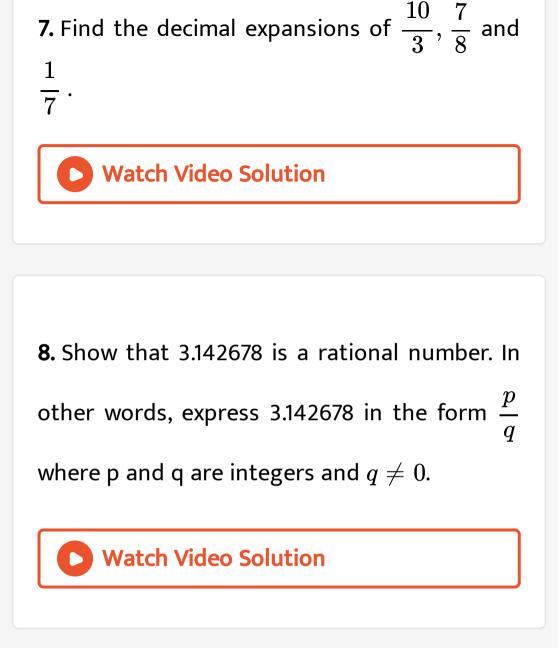
3. Is the following statement true of false? Give reasons for your answers.Every rational number is an integer.

4. Find five rational numbers between 1 and 2. We can approach this problem in at least two

ways.

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5. Locate $\sqrt{2}$ on the number line.

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6. Locate $\sqrt{3}$ on the number line.

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7. Find the decimal expansions of $\dfrac{10}{3}$, $\dfrac{7}{8}$ and $\dfrac{1}{7}$.

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8. Show that 3.142678 is a rational number. In other words, express 3.142678 in the form $\dfrac{p}{q}$ where p and q are integers and $q \neq 0$.
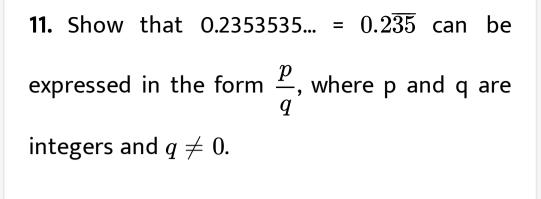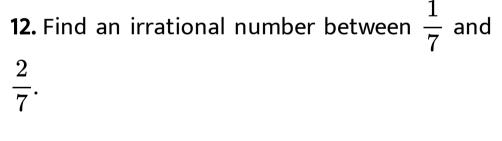
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9. Show that 0.3333... =0. $\overline{3}$ can be expressed in the form $\dfrac{p}{q}$, where p and q are integers and $q \neq 0$.

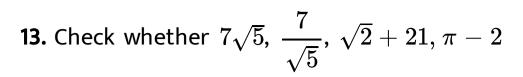**10.** Show that 1.272727... =1. $\overline{27}$ can be expressed in the form $\dfrac{p}{q}$, where p and q are integers and $q \neq 0$.

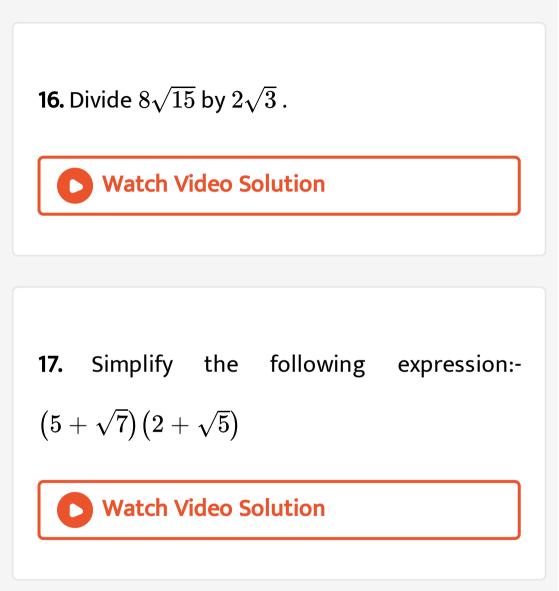**11.** Show that $0.2353535... = 0.2\overline{35}$ can be expressed in the form $\dfrac{p}{q}$, where p and q are integers and $q \neq 0$.

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12. Find an irrational number between $\dfrac{1}{7}$ and $\dfrac{2}{7}$.

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13. Check whether $7\sqrt{5}$, $\dfrac{7}{\sqrt{5}}$, $\sqrt{2} + 21$, $\pi - 2$

are irrational numbers or not.

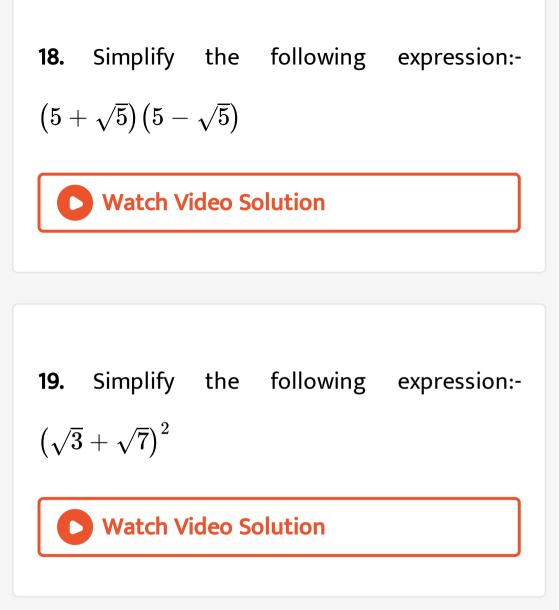▶ **Watch Video Solution**

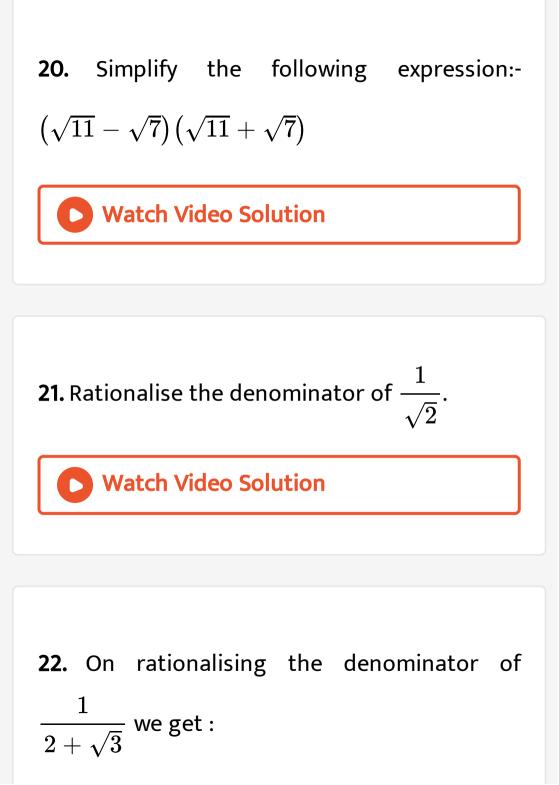**14.** Add $2\sqrt{2} + 5\sqrt{3}$ and $\sqrt{2} - 3\sqrt{3}$.

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15. Multiply $6\sqrt{5}$ by $2\sqrt{5}$.

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16. Divide $8\sqrt{15}$ by $2\sqrt{3}$.

17. Simplify the following expression:-

$$\left(5 + \sqrt{7}\right)\left(2 + \sqrt{5}\right)$$

18. Simplify the following expression:-

$$\left(5 + \sqrt{5}\right)\left(5 - \sqrt{5}\right)$$

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19. Simplify the following expression:-

$$\left(\sqrt{3} + \sqrt{7}\right)^2$$

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20. Simplify the following expression:-

$$\left(\sqrt{11} - \sqrt{7}\right)\left(\sqrt{11} + \sqrt{7}\right)$$

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21. Rationalise the denominator of $\dfrac{1}{\sqrt{2}}$.

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22. On rationalising the denominator of $\dfrac{1}{2 + \sqrt{3}}$ we get :

23. Rationalise the denominator of $\dfrac{5}{\sqrt{3} - \sqrt{5}}$.

24. Rationalise the denominator of $\dfrac{1}{7 + 3\sqrt{2}}$.

25. Simplify : $2^{\frac{2}{3}} \cdot 2^{\frac{1}{5}}$

26. Simplify $\left(3^{\frac{1}{5}}\right)^4$

27. Simplify $\dfrac{7^{\frac{1}{5}}}{7^{\frac{1}{3}}}$

28. On simplifying $13^{\frac{1}{5}} \cdot 17^{\frac{1}{5}}$ we get :

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