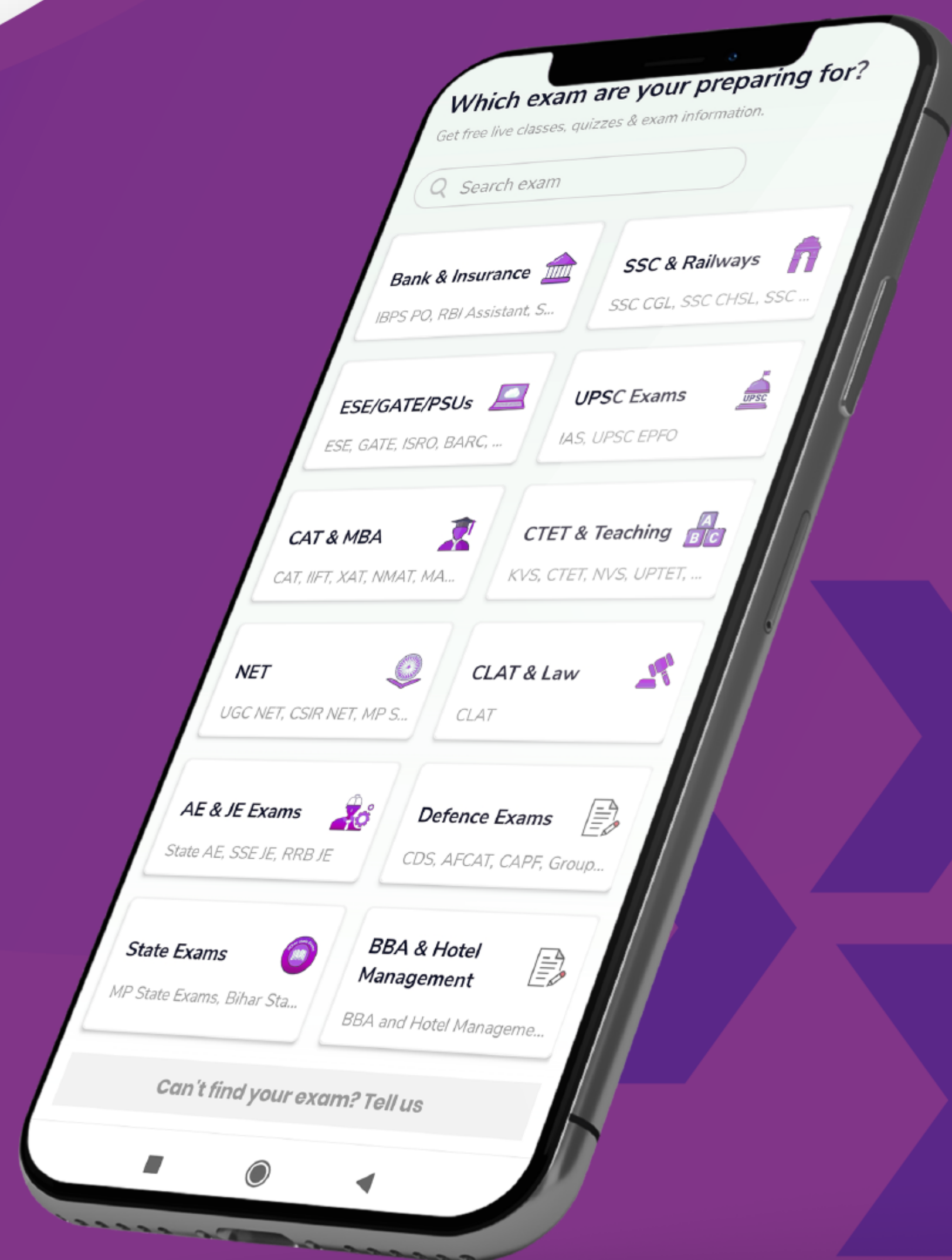


Formula Sheet On Ratio & Proportion



Types Of Ratio

Let us assume that, two numbers are 'a' and 'b'.

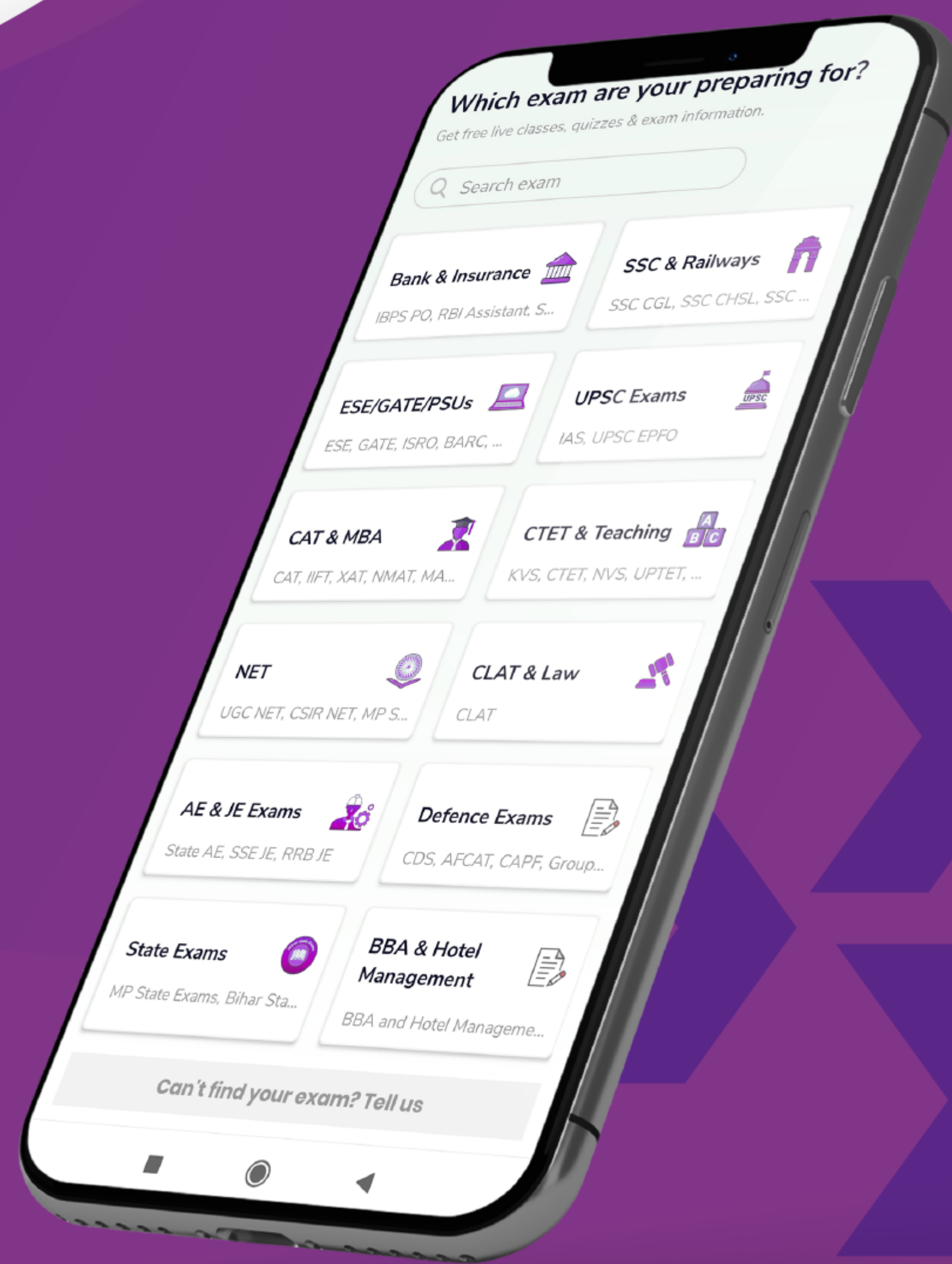
Then the ratio is $a : b$.

Therefore,

1. Duplicate ratio: $a^2 : b^2$

2. Sub duplicate ratio: $\sqrt{\frac{a}{b}}$

3. Triplicate ratio: $a^3 : b^3$

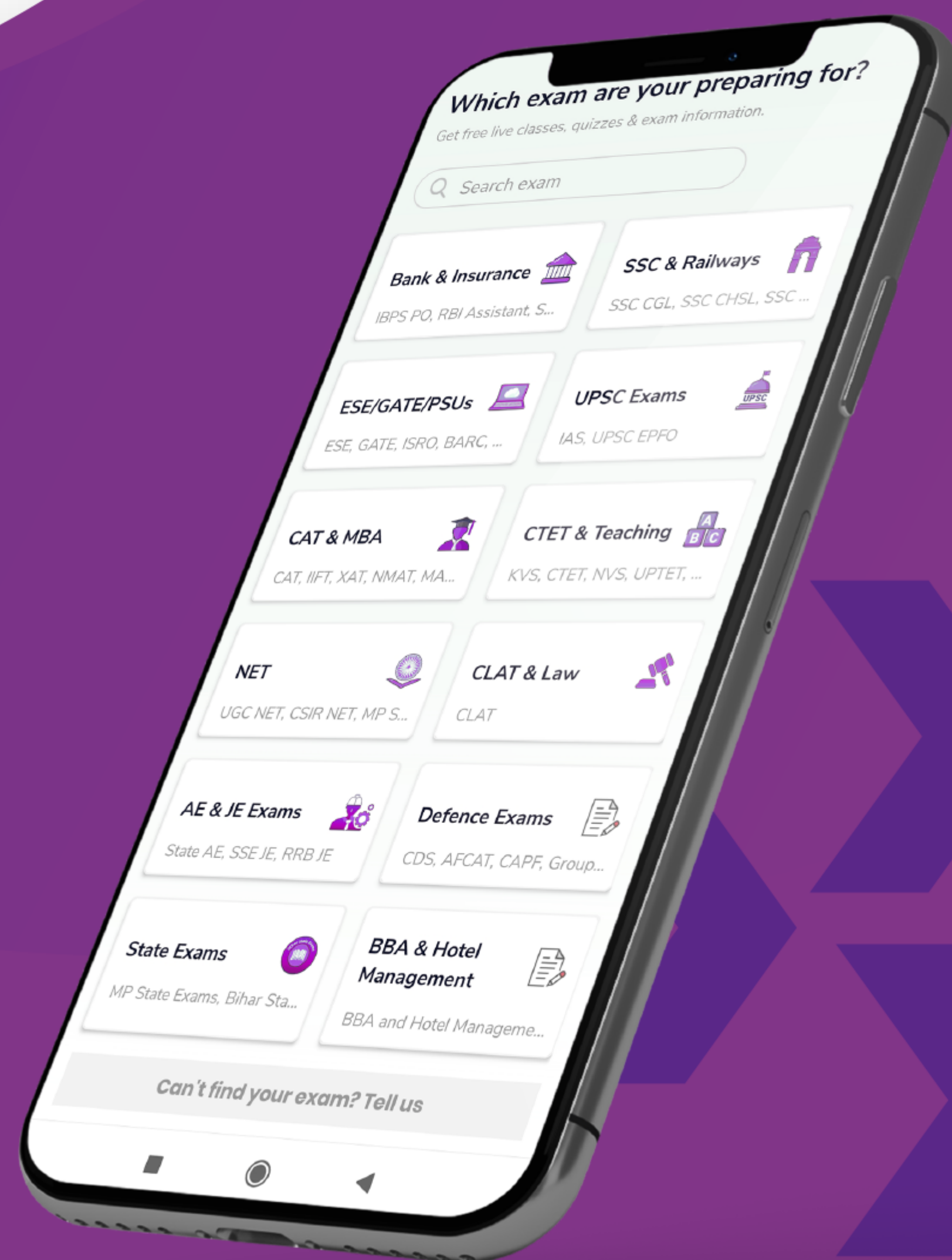


4. Sub triplicate ratio: $\sqrt[3]{a} : \sqrt[3]{b}$

5. Inverse ratio: $\frac{1}{a} : \frac{1}{b}$

6. If three different ratios are $a : b$, $c : d$ and $d : e$

Compounded ratio: $\frac{acd}{bde}$



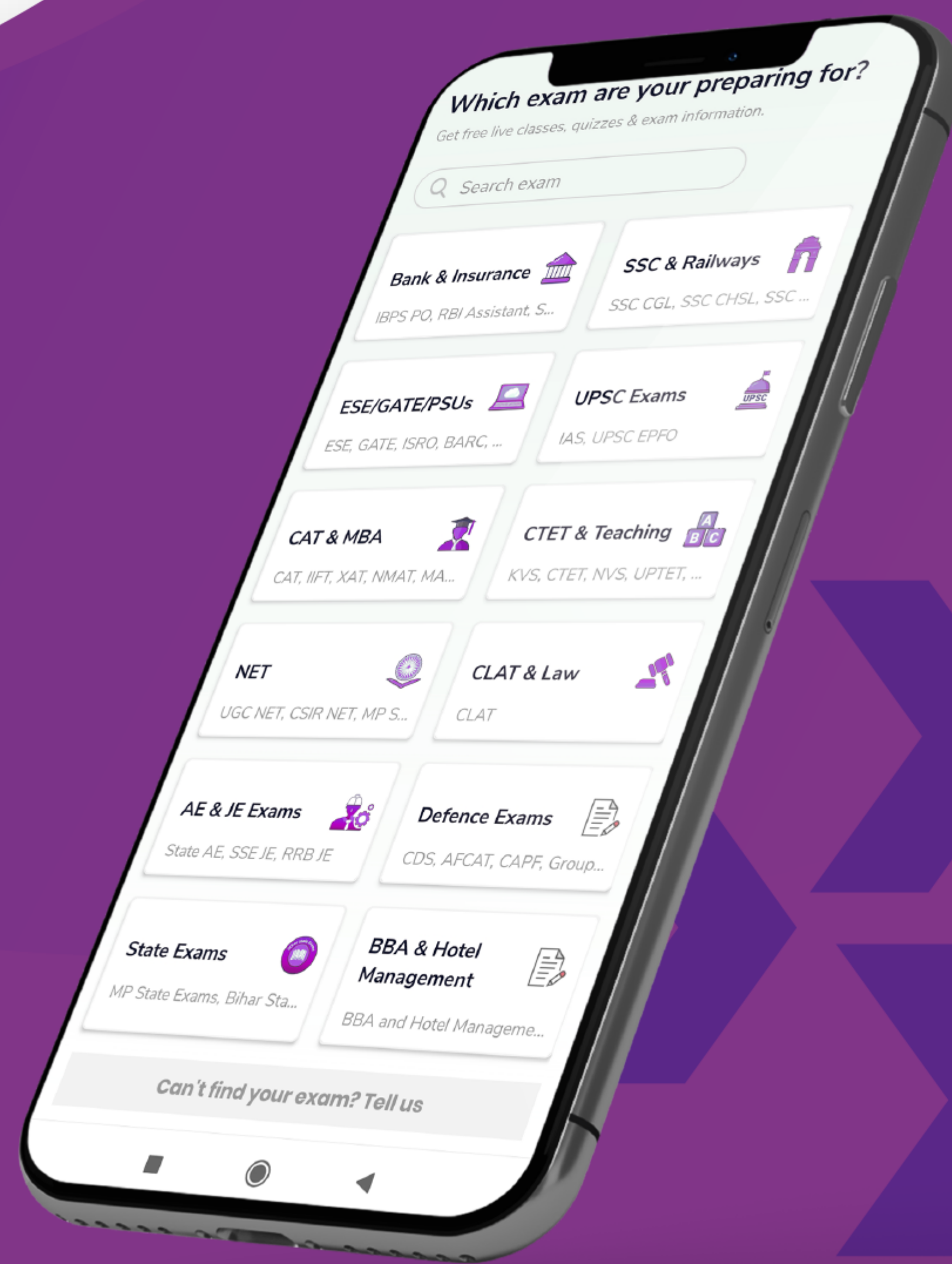
Some important properties of ratio

1. If in the ratio a/b , the numerator and the denominator are multiplied or divided by the same number then the value of the ratio remains same.

Case 1: Multiplying numerator and denominator by same number x :

$$\text{Ratio} = \frac{a}{b} = \frac{xa}{xb}$$

Thus, cancelling out x further results in same ratio a/b .



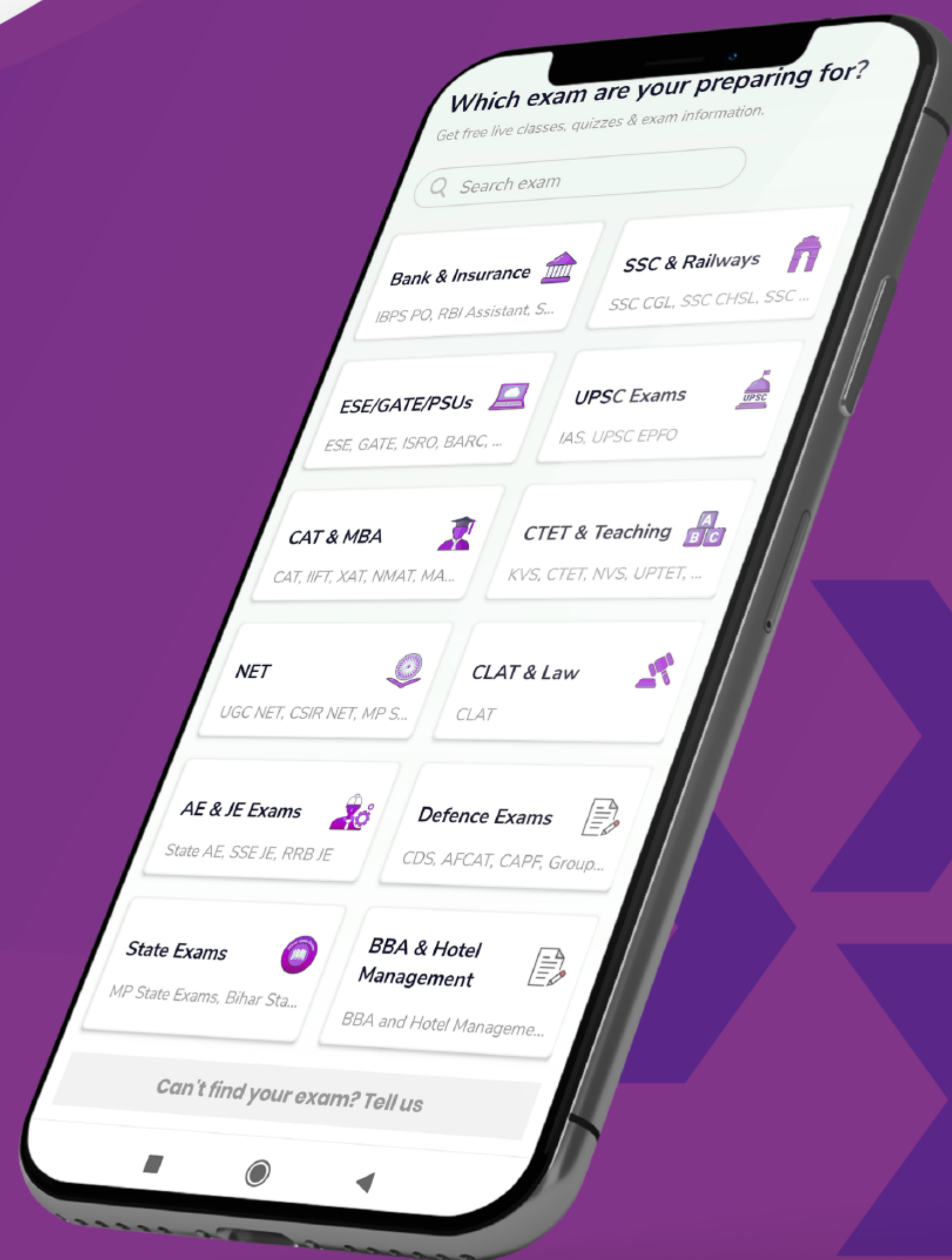
Case 2: Dividing numerator and denominator by same number y :

$$\text{Ratio} = \frac{a}{b} = \frac{\frac{a}{y}}{\frac{b}{y}}$$

Thus, cancelling out y further results in same ratio a/b .

2. If $p/q = r/s = t/u = v/w = m$ then

$$m = \frac{p+r+t+v}{q+s+u+w}$$



Comparison of two ratios

Suppose we have to compare two different ratios $\frac{12}{17}$ and $\frac{13}{11}$.

Here to find which ratio is greater or lesser than other, we use cross multiplication method.

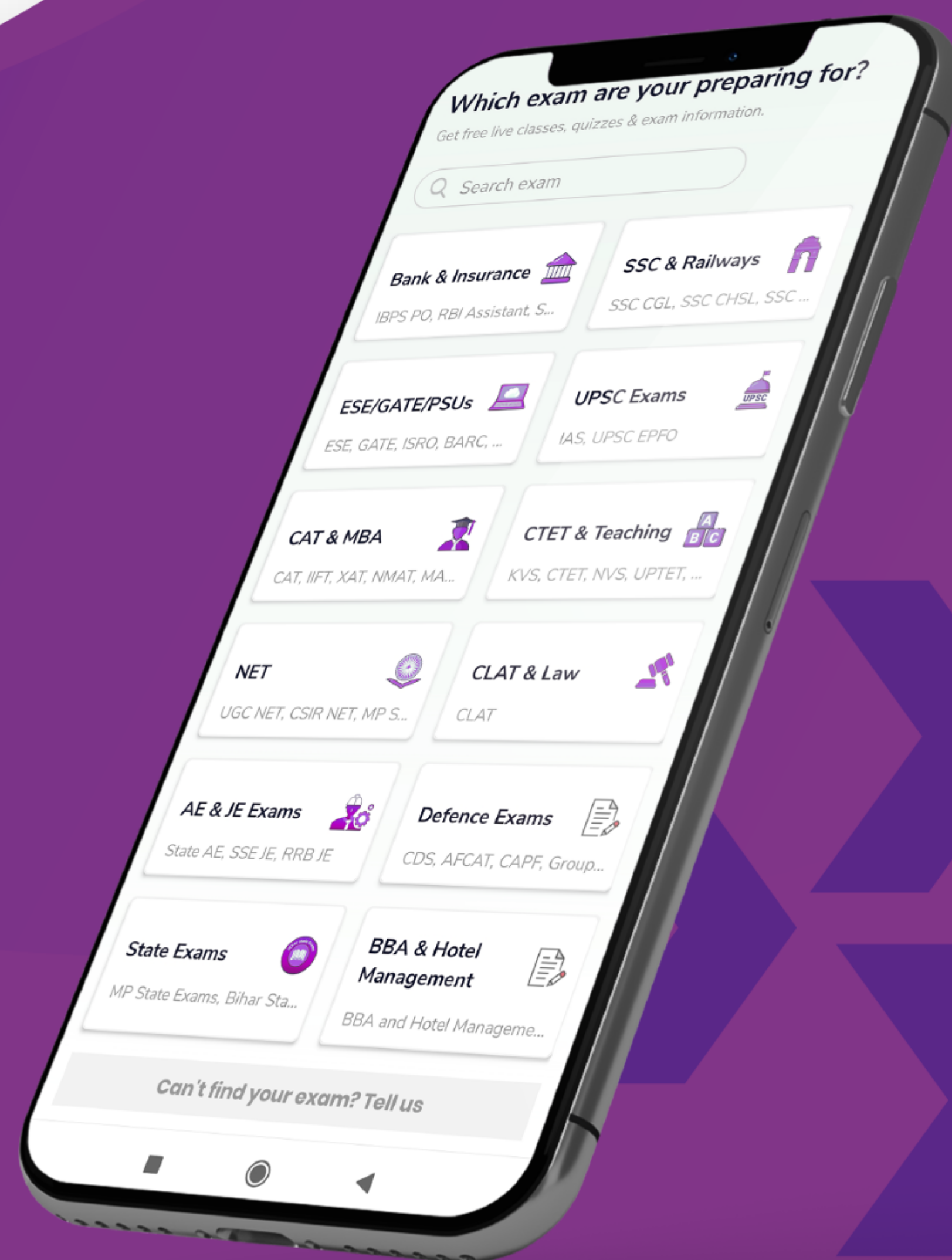
Simply cross multiply the denominator to the numerator of another ratio.

$$\frac{12}{17} \quad \frac{13}{11}$$

$$(12 \times 11) \quad (13 \times 17)$$

$$= 132 \quad 221$$

Comparing we get $132 < 221$ thus, $\frac{12}{17} < \frac{13}{11}$.



Types Of Proportion

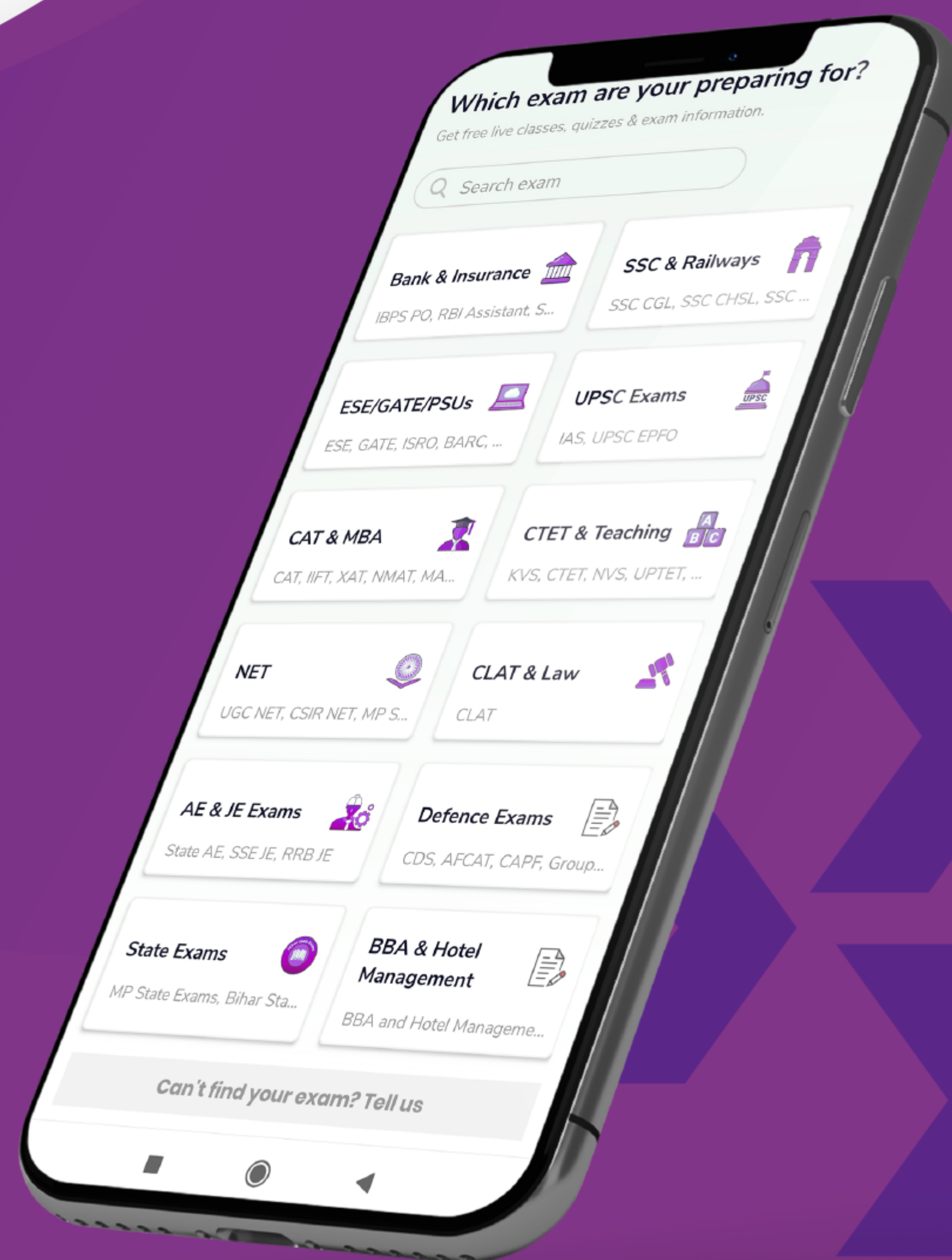
Proportion: If two ratios are equal then the 4 terms are called proportion.

For example: $= \frac{a}{b} = \frac{c}{d}$

It can also be written as:

a : b :: c : d

Here terms a and d are called extremes and terms c and d are called means.



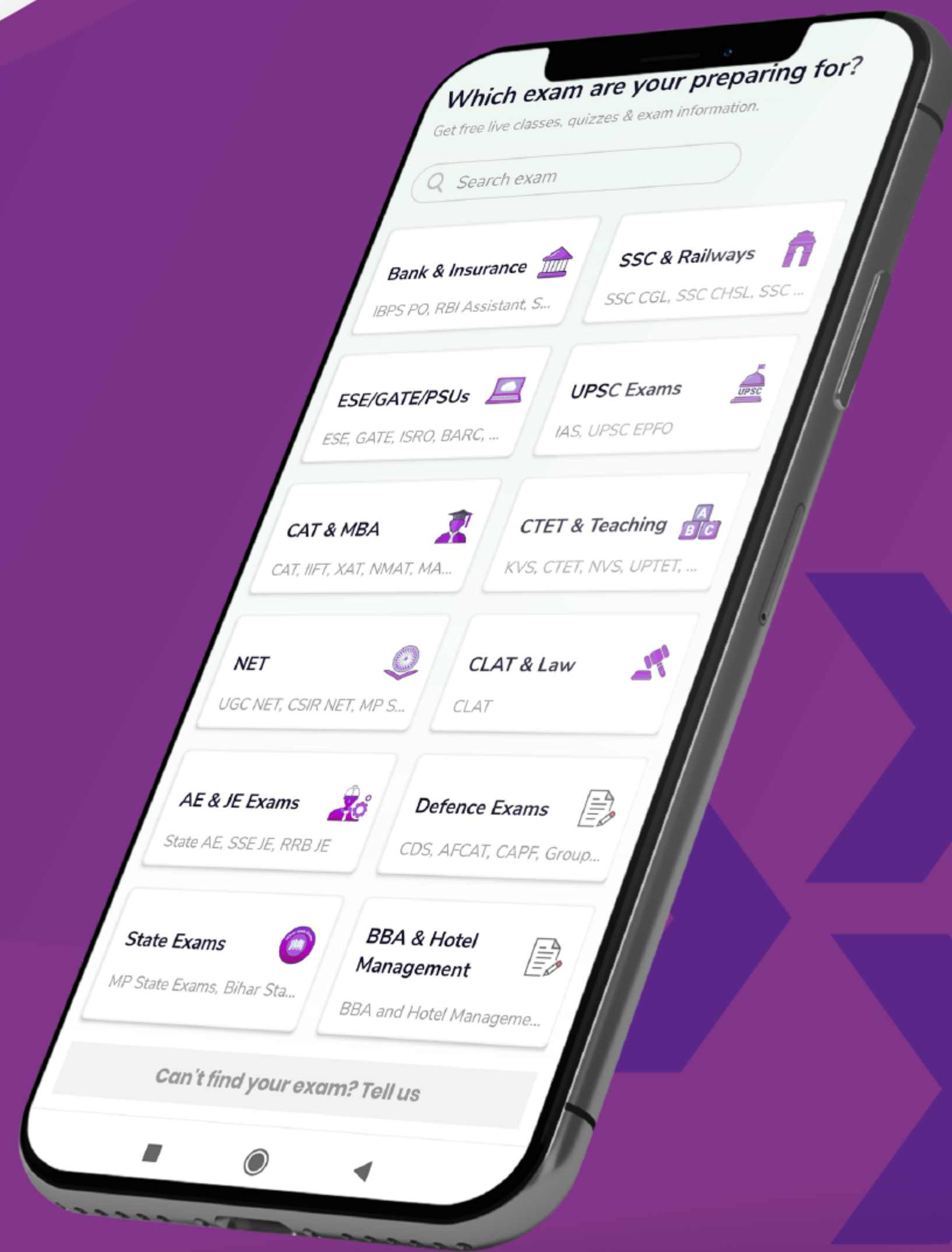
If the ratio is $a : b$

1. Mean proportion: \sqrt{ab}

2. Third proportion: $\frac{b^2}{a}$

3. If three numbers a , b and c are given then

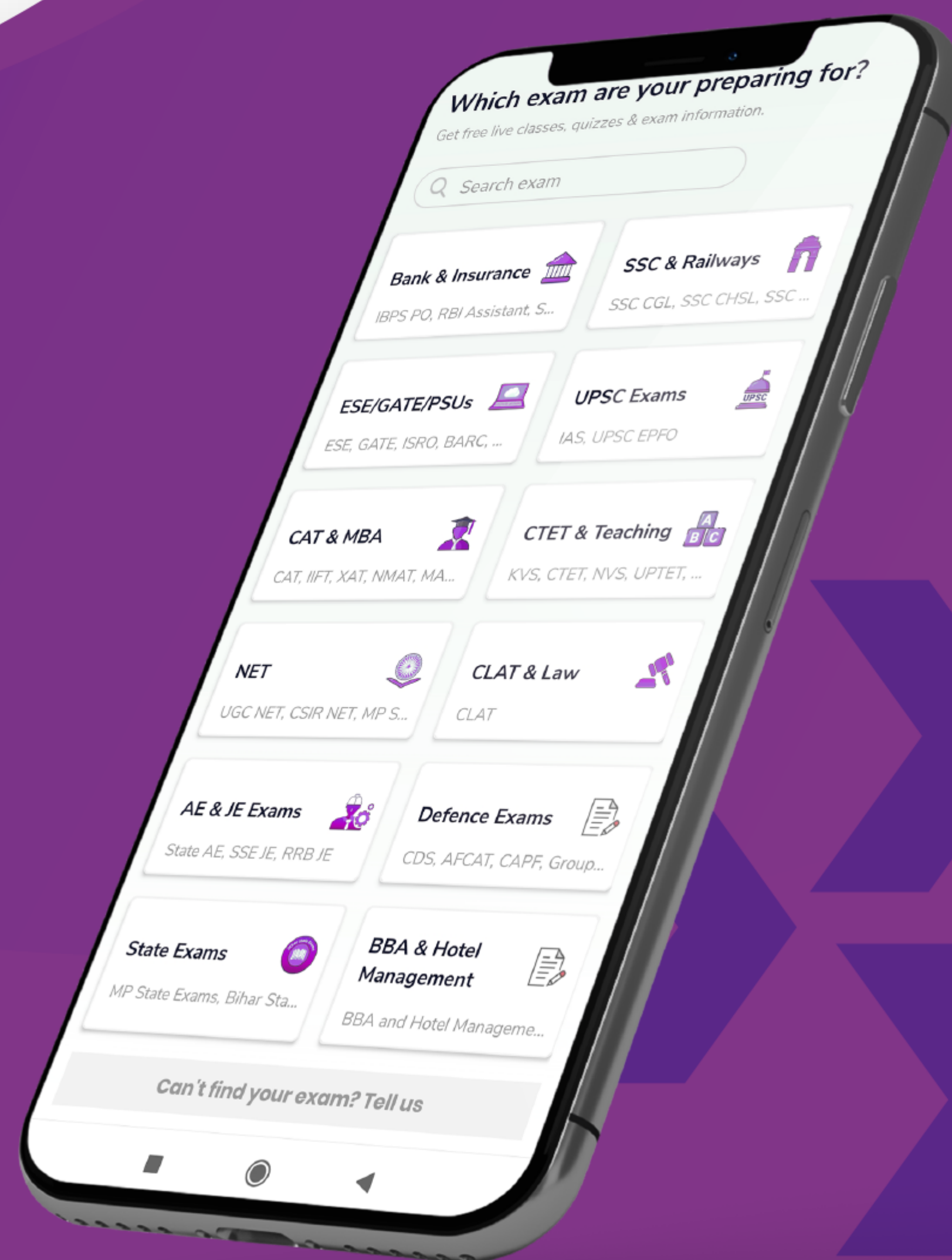
Fourth proportion: $\frac{bc}{a}$



2. If $a : b = 1 : 2$, $b : c = 3 : 4$ and $c : d = 2 : 3$

$$a : b : c : d = \begin{array}{c} 1 : 2 \\ \swarrow \quad \searrow \\ 3 : 4 \\ \swarrow \quad \searrow \\ 2 : 3 \end{array}$$

$$\Rightarrow a : b : c : d = 6 : 12 : 16 : 24$$



Note

1. If $a : b = 2 : 3$ and $b : c = 4 : 5$

Then

$$\underline{a} : b : c = \begin{array}{c} 2 : 3 \\ \downarrow \quad \swarrow \quad \downarrow \\ \underline{4} : 5 \end{array}$$

$$a : b : c = \begin{array}{ccc} 8 & : & 12 & : & 15 \\ \swarrow \quad \searrow & & \swarrow \quad \searrow & & \swarrow \quad \searrow \\ (2 \times 4) & & (3 \times 4) & & (3 \times 5) \end{array}$$

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