Derivation of mirror formula class 12 pdf

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Display themes class 12 Physics Ray Optics Optical tools Mirror formula concave mirror (1/v) + (1/u) = (1/f) Where: The distance of the object from its pole is called the distance of the object (u). The distance of the image from the pole of the mirror is called the distance of the image (v). The distance of the main focus from the pole is called focal length (e). The mirror equation connects the distance of the image (v) with the distance of the object (u) and focus (f) Length Insave concave mirrors, object AB placed at the front of the concave mirror. The image is A'B'. Consider two rectangular similar triangles A'B'F and MPF. Therefore (B'A'/PM) = (B'F/FP) Or (B'A'/BA) = (B'F/FP) (because PM= AB) (1) Since <APB ==></APB> <AP'B', the= right= angles= triangles= are= also= similar.= therefore,= (b'a'/ba)=(B&P'/BP) (2)= comparing= equations= (1)= and= (2):-= (b'f/fp)=(B&P-fp)/(fp)=(PB')/(PB) equation= (a)= considering= the = sign= conventions:= light= travels= from= the= object= to= the= mirror= mpn.= hence= this= is= taken= as= the = positive= direction.= the= object= ab,= image= a′b′= as= well= well= as= the= focus= f= from= the= pole= p,= we= have= to= travel= to= the = direction= of= incident= light.= therefore= all= are= taken= as= negative.= this= implies,= b&p=-v ,= fp=-f and= bp=-u therefore equation= (a)= changes= to:= (-v= -f)/(-f)=(-v/-u) or= (v-f)/(f)=(v/u) ==>(1/v) + (1/u) = (1/f) This relationship is known as a mirror equation. (concave mirror) (b) In the case of a convex mirror using equation (A) (B'F/FP) = (B'P-FP)/FP) = (PB')/(PB) Image Distance PB' = (+v) in the direction of the pole beam and in the direction of the beam of the incident. PF= + f as it is also on the incident beam. Object distance PB= (-u) as in the direction opposite to the beam of the incident. Replacement of values, (v-f)/(u) = (+ v /- - u) = > (v/f) – 1 = (-v/u) Separation of the whole by e, (1/f) – (1/v) =(-1/u) Or (1/f) = (1/v) – (1/u) Therefore the mirror equation will be:- (1/f) = (1/f) = (1/v) 1/v) – (1/u) Magnification of linear scaling of a spherical mirror (m) obtained from a spherical mirror, gives the relative extent to which the object image is enlarged in terms of object size. Mathematically, m = (height of the image h')/(object height h) Or, m = (h')/(h) If the zoom mark is negative, then the image is real and if positive, the image is virtual. A real, inverted image is formed from a concave mirror. In triangles A'B'P and ABP, we have, (-B'A'/BA) =(-B'P/(BP) (From equation 2) Applying a convention sign, it becomes (-h'/h) = -(-v/- u) therefore, m = (h'/h) = (- v /u) concave mirror In case of convex mirror: Virtual and ecererative image is formed. m = (h'/h) = (A'B')/(AB) = (PB')/(PB) m = -(v/u) Convex mirror Note: - It is valid for all cases of reflection by a spherical mirror (concave or whether the image formed is real or virtual. < prev= next=> . If you see this message, it means that we have problems loading external resources on our website. If you are behind a web filter, please make sure that</AP'B',> that</AP'B',> *.kastatic.org and *.kasandbox.org are unblocked. If you see this message, it means that we have problems loading external resources on our website. If you are behind a web filter, please make sure that the *.kastatic.org and *.kasandbox.org domains are unblocked. Extracting the mirror formula is one of the most frequently asked questions in the various on-board exams as well as competitive exams. A mirror formula can be defined as the formula that gives the ratio between the distance of the object u, the distance of the image v and the focal length of the mirror f. The mirror formula is applicable to both flat mirrors and spherical mirrors (convex and concave mirrors). This provides the mirror formula so that students can understand the concept of the topic in a better way. The mirror formula is recorded as: Assumptions for extracting mirror formula The following assumptions are taken to obtain the mirror formula. Distances are measured from the pole of the mirror. According to the Convention, the negative sign indicates the distance measured in the direction opposite to the beam of the incident, while the positive sign indicates the distance measured in the direction of the beam of the incident. The distance below the axis is negative, and the distance above is positive. Extract mirror formula Extract mirror formula is given below. The diagram given below will help learners understand more effectively the extraction of the mirror formula. From the figure mentioned above, it is obvious that the object AB is located at a distance of U from P, which is the pole of the mirror. From the diagram we can say that the image A1B1 is formed in V from the mirror. Now from the above diagram it is clear that according to the law of vertically opposite corners, the opposite angles are equal. So we can write: This is a derivative of a mirror formula. Students need to understand every step of extracting the mirror formula to gain some of the in-depth knowledge of the subject. Stay tuned with BYJU'S and learn various other derivatives of physics formulas. CBSE Class 12 How to extract a mirror equation? The mirror formula is the relationship between the distance of the object (u), the image distance (v) and the focal length. 19. At the place of receipt of the concave mirrors, the figure shows object AB at a distance u from the pole of the concave mirror. The A1B1 image is formed at a distance of v from the mirror. The position of the image is obtained by drawing a beam diagram. D A1CB1 and D ACB [when two angles of D A1CB1 and D ACB are equal, then the third corner But ED = AB of equations (1) and (2) If D is very close P then EF = PF But PC = R, PB = u, PB 1 = v, PF = is the Default PC Convention = -R, PB = -u, PF = -f and PB 1 = -v equation (3) can be written as a dividing equation (4) by uvf we get therefore , equation (5) gives the formula of the mirror. Formula.

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