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$$AD : AB = AH : AC$$
$$\implies (b - h) : c = (c - a) : b$$
$$\implies c(c - a) = b(b - h)$$
$$\implies c^2 = b^2 + ac - bh \qquad (1)$$

$$DH : BC = AH : AC$$
$$\implies h : a = (c - a) : b$$
$$\implies bh = a(c - a)$$
$$\implies a^2 = ac - bh \qquad (2)$$

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