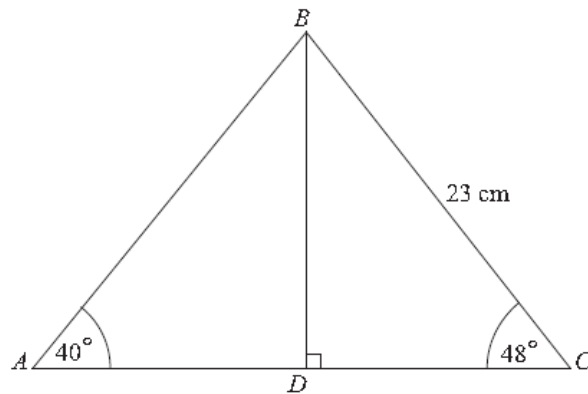In this question, you are asked to comment on a student's incorrect attempt at answering the following question.

In triangle ABC, the length of side BC is $23\,\text{cm}$. D is a point on AC with $\angle BAD = 40°$, $\angle BDC = 90°$ and $\angle DCB = 48°$.

(i) Use the sine rule to find the length of AB.

(ii) Find the length of AD.

Give answers correct to two significant figures.

The student's incorrect attempt is shown below.

(i) Using the sine rule in triangle ABC

$$\frac{AB}{\sin C} - \frac{BC}{\sin A}$$

$$\frac{AB}{\sin 40°} - \frac{23}{\sin 48°}$$

$$AB \quad \frac{23 \sin 40°}{\sin 48°}$$

$$19.89 \dots$$

The length of AB is 20 cm (correct to 2 s.f.)

(ii) Triangle ADB is a right angled triangle so

$$\sin 40° \quad \frac{AD}{AB}$$

$$AD \quad AB \times \sin 40°$$

$$20 \times \sin 40°$$

$$12.85 \dots$$

The length of AD is 13 cm (to 2 s.f.)

(a) Write out your own solution to the question, explaining your working.

(b) There are three places in the student's attempt where a mistake has been made. Identify these mistakes and explain, as if directly to the student, why, for each mistake, their working is incorrect.