Sadiq Public School

Do the right, fear no man

Subject: Physics **Class: S1**

Date: Friday, 16th November 2024 **Topic: Uniform Circular Motion (Part two)**

A: Inquiry:

As centripetal force is a force so is there any reaction of this force? Why roads are banked? How does washing machine dryer and cream separator work on the principles of Physics?

B: Information:

Topic 3.4: Uniform Circular Motion (Part two)

Centrifugal Force

According to Newton's third law of motion, there is an equal and opposite outward reaction of centripetal force that is called centrifugal force.

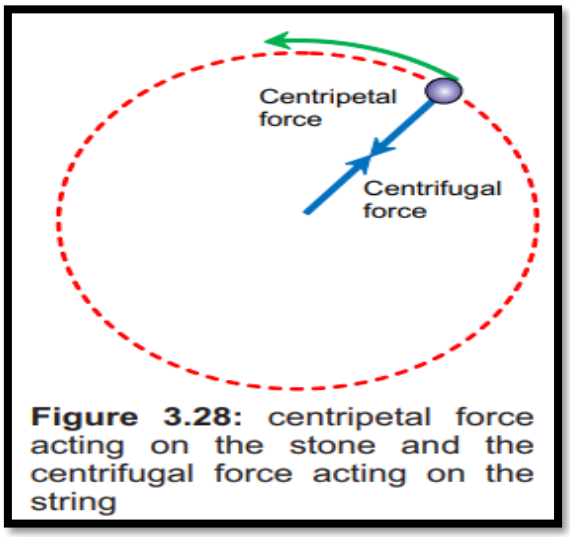

Figure 3.28: centripetal force acting on the stone and the centrifugal force acting on the string

Applications of centripetal force

Here are some applications of centripetal force from our daily life.

(a) Banking of the roads

(b) Washing machine dryer

(c) Cream separator

Now, we will see each application in detail.

(a) Banking of the roads

When a car takes a turn, centripetal force is needed to keep it in its curved track. The friction between the tyres and the road provides the necessary centripetal force. The car would skid if the force of friction between the tyres and the road is not sufficient enough particularly when the roads are wet. This problem is solved by banking of curved roads. Banking of a road means that the outer edge of a road is raised. Imagine a vehicle on a curved road such as shown in following figure. Banking causes a component of vehicle's weight to provide the necessary centripetal force while taking a turn. Thus, banking of roads prevents skidding of vehicle and thus makes the driving safe.

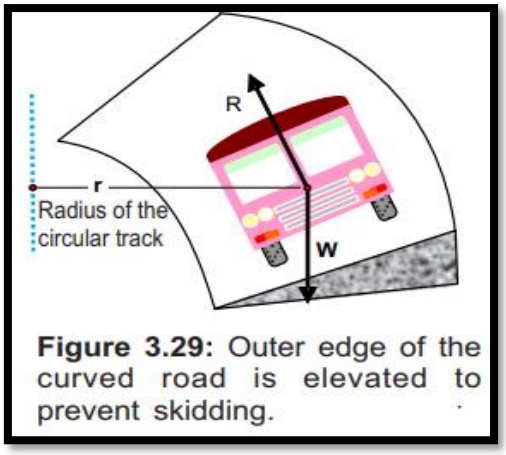

Figure 3.29: Outer edge of the curved road is elevated to prevent skidding.

(b) Washing machine dryer

The dryer of a washing machine is basket spinners. They have a perforated wall having large numbers of fine holes in the cylindrical rotor as shown in following figure. The lid of the cylindrical container is closed after putting wet clothes in it. When it spins at high speed, the water from wet clothes is forced out through these holes due to lack of centripetal force.

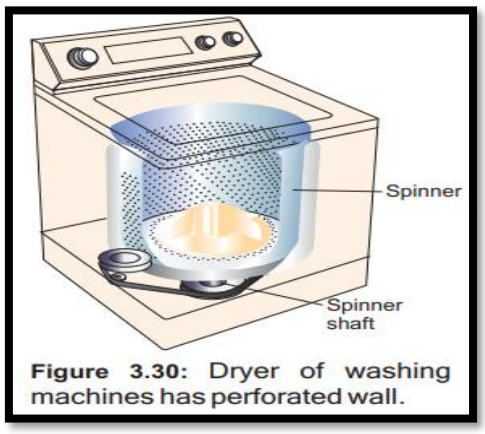

Figure 3.30: Dryer of washing machines has perforated wall.

(c) Cream separator

Most modern plants use a separator to control the fat contents of various products. A separator is a high-speed spinner. It acts on the same principle of centrifuge machines. The bowl spins at very high-speed causing the heavier contents of milk to move outward in the bowl pushing the lighter contents inward towards the spinning axis. Cream or butterfat is lighter than other components in milk. Therefore, skimmed milk, which is denser than cream is collected at the outer wall of the bowl. The lighter part (cream) is pushed towards the centre from where it is collected through a pipe.

Figure 3.31: A Cream separator

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- Read pages # 78-80 of textbook.
- Watch the following videos for further understanding:

https://youtu.be/4eypmzfq7KU?feature=shared
https://youtu.be/4eypmzfq7KU?feature=shared
https://youtu.be/hGocAuDuj8Y?feature=shared

C: Synthesising/absorbing information

In your notebooks

(1) Write a detailed note on applications of centripetal force.

D: Practicing

Answer the following questions and write short answers in your notebooks.

(i) Define centrifugal force.
(ii) Name any three applications of centripetal force from daily life.
(iii) Why roads are banked?
(iv) How does washing machine dryer work?

(v) Explain the working of cream separator on the basis of principles of Physics.

E: Feedback

Students: Please if you have any questions at all about this topic, any words you do not understand, anything at all, please send your concerned teacher an email and you will get a reply as soon as possible.

Class	Teachers' Names	Teachers' Abbreviations	Teachers' Email Addresses	Instructions
S1A	Muhammad Jahanzeb	MJA	jahanzeb_MJA_sadiq@protonmail.com	S1A students will send their home assignments to their subject teacher (MJA) for checking and getting feedback.
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