Math 1435 – Test 2 review

Info:

- 15 questions – to be done in 1 hour and 30 minutes. More time may be allotted for submission if the test is held online.
- Test 2 covers:
  - 2 definitions.
  - Calculating square root & squaring.
  - Calculating area.
  - Calculate volume
  - Pythagoras theorem.
  - Pulley calculations.
  - Rim speed calculations.
  - Pulley and rim speed combination calculations.
  - Bandsaw blade & Edge sander belt length calculation.
  - Glue mix calculation.

Practice Problems

1. Define the term Diameter.
2. Define the term Radius.
3. What is the square root of 144?
4. What is the square root of 1,764?
5. The height of a rafter on a building is 8'-8" and the total width of the roof 24'. What is the length of the rafter of this building?
6. What is the diameter of a pulley that rotates at 500 rpm if it is *driven* by a 6" dia. Pulley running at 1720 rpm?
7. A 2" pulley revolving at 1650 rpm *drives* a 6" pulley at what rpm?
8. Calculate the rim speed of a 3" cutter revolving at 5,000 rpm.
9. Calculate the rim speed of a 5"\cutter revolving at 6,000 rpm
10. A saw blade has a diameter of 12" and a motor speed of 3200 rpm. What size of pulleys should be used to achieve the optimum rim speed of 14,000 lfm? (do not use a 1" pulley).

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11. A saw blade has a diameter of 10" and a motor speed of 3600 rpm. What size of pulleys should be used to achieve the optimum rim speed of 14,000 lfm? (do not use a 1" pulley).

12. A 2 wheel bandsaw has 18" dia. Wheels and a center-to-center measurement of 74". What length of blade do you require?

13. A 2 wheel bandsaw has 22" dia. Wheels and a center-to-center measurement of 64". What length of blade do you require?

14. You want to mix 550 ml of glue. The recipe calls for a ratio of 18:3:2 resin: water: catalyst. How much of each item do you need to make the 550 ml?

15. You are making the following panels:

Panel finished size: 75" x 24"   Panel construction: 5 ply

Quantity: 40 panels   Glue coverage: 20 g / sqft

Waste: 10%   Mix ratio: 18:3:2 (resin: water: catalyst)

How much resin, water and catalyst do you need to make these panels?

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Answer Key

1. Diameter – The distance measured on a circle from outside to outside.
2. Radius – The distance measured on a circle from its center point to its perimeter.
3. √144 = **12**
4. √1764 = **42**
5. 8'-8"height, 24' total width of building (8'-8"=8.6666) (use only half of the building width for the width of the triangle)

   C² = A² + B²

   C² = (8.66666²) + (12²)

   C² = 75.1111111 + 144

   C² = 219.11111

   C = √219.1111111

   C = 14.80240221'

6. Ø of a pulley at 500 rpm, driven by a 6" pulley at 1720 rpm

   $$PR = Drive/Driven$$

   1720/500 = 3.44

   Pulley factor of 3.44 X 6" pulley

   Unknown pulley = 20.64"

   Therefore the arbor pulley will be 20.64"

7. 2" pulley revolving at 1650 rpm drives a 6" pulley at what speed?

   Pulley ratio = drive / driven

   Pulley ratio = 2 / 6

   Pulley ratio = 0.33333

   Arbor speed = motor speed x pulley factor

   Arbor speed = 1650 x 0.3333

   Arbor speed = 550 rpm

8. Rim Speed = $\frac{\pi \, x \, D}{12} \, x \, rpm$

   Rim Speed = $\frac{\pi \, x \, 3}{12} \, x \, 5000$

   Rim Speed = 3,926.990817 LFM

9. Rim Speed = $\frac{\pi \, x \, D}{12} \, x \, rpm$

   Rim Speed = $\frac{\pi \, x \, 5}{12} \, x \, 6000$

   Rim Speed = 7,853.981634 LFM

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10. Saw blade 12", motor speed 3200 rpm, opt. rim speed 14,000 LFM

Rim Speed = $\frac{\pi \, x \, D}{12} \, x \, rpm$

$14000 = \frac{\pi \, x \, 12}{12} \, x \, rpm$

$14000 = \pi$ x rpm

$\frac{14000}{\pi}$ = rpm

= **4,456.338407 rpm** (arbor speed)

      Pulley factor = drive / driven

      Pulley factor = 3200 / 4456.338407

      Pulley factor = 0.71807832

Therefore, if we use a 7" drive pulley and a 5" driven pulley (7 x 0.71807832 = 5.026548245) we will achieve our desired rim speed.

11. Saw blade 10", motor speed 3600 rpm, opt. rim speed 14,000 LFM

Rim Speed = $\frac{\pi \, x \, D}{12} \, x \, rpm$

$14000 = \frac{\pi \, x \, 10}{12} \, x \, rpm$

$14000 = 2.617993878$ x rpm

$\frac{14000}{2.61993878}$ = rpm

= **5,347.606088 rpm** (arbor speed)

      Pulley factor = drive / driven

      Pulley factor = 3600 / 5347.606088

      Pulley factor = 0.673198425

Therefore, if we use a 3" drive pulley and a 2" driven pulley (3 x 0.673698543 = 2.019595277) we will achieve our desired rim speed.

12. Bandsaw blade length = (π x D) + (2 x center to center)

Blade length = (π x 18) + (2 x 74)

Blade length = 56.54866776 + 148

Blade length = 204.5486678"

13. Bandsaw blade length = (π x D) + (2 x center to center)

Blade length = (π x 22) + (2 x 64)

Blade length = 69.11503838 + 128

Blade length = 197.1150384"

14. 550 ml of glue, mix 18:3:2 resin/ water/ catalyst

Total parts = 18+3+2 = 23

   550ml / 23 = 23.91304348 ml per part

   Resin = 18 parts x 23.91304348 = 430.4347826 ml

   Water = 3 parts x 23.91304348 = 71.73913043 ml

   Catalyst = 2 parts x 23.91304348 = 47.82608696 ml

15. 40panels, finished size 75" x 24", 5 ply, coverage 20g/sqft, waste 10%, mix ratio 18:3:2 (resin/water/catalyst)

Add 1" to o/a size for squeeze out and trimming

Sqft of 1 glue line = 76 x 25

   =6.333333 x 2.08333333 (converted to decimal ft)

   = 13.19444444 sqft

Sqft of 1 glue line x # of glue lines in a panel x # of panels = total sqft glue

13.19444444 x 4 x 40 = 2111.111111 sqft total

   Total glue = 2111.111111x20 (coverage 20g/sqft) = 42,222.222222g

   Plus waste = 42,222.222222 + 10% = 46,444.44444 g of glue

Mix 46,444.44444 g / 23 parts (18+3+2) = 2,019.323671 g per part

Therefore,

   Resin = 18 x 2,019.323671 = 36,347.82609g

   Water = 3 x 2,019.323671 = 6,057.971014g

   Catalyst = 2 x 2,019.323671 = 4,038.647343g