

# ADEQ

Arizona Department  
of Environmental Quality



## OPERATOR MATH PDH WORKBOOK

Completion of this workbook will count for 1 PDH

Arizona Department of Environmental Quality  
Drinking Water Section-Programs Unit  
Operator Certification Program  
1110 West Washington Street  
Phoenix, AZ 85007  
[www.azdeq.gov](http://www.azdeq.gov)

NAME \_\_\_\_\_

OPCERT NUMBER OP0 \_\_\_\_\_

DATE \_\_\_\_\_

## DIRECTIONS

Answer the questions in the space provided with concise and accurate answers. Mail the completed booklet to the address provided. It is recommended that you keep a copy of the completed booklet for your records. Completion of this workbook will earn the operator one (1) PDH. Please print clearly. Workbooks that are illegible will not receive PDHs.

PDH means professional development hour.

A professional development hour is equal to one contact hour of continuing education. A total of 30 professional development hours are required for each 3-year renewal period regardless of the number of certificates that are held by an individual operator. Ten of the thirty PDHs must be directly related to an operator's job.

The type of PDH acceptable to the Department for certificate renewal include, but are not limited to: an approved college course, a course offered by a Certified Environmental Trainer, regulatory and tribal agency training, certain types of in-house training, technical conferences, correspondence courses, and manufacturer product training. An accredited college course is usually recorded in credit hours. In general, 1 college credit hour = 10 PDHs. If an operator has a question about a specific type of training, please contact the Operator Certification Coordinator for approval before attending the training.

## FOR MORE INFORMATION, CONTACT:

### Bill Reed

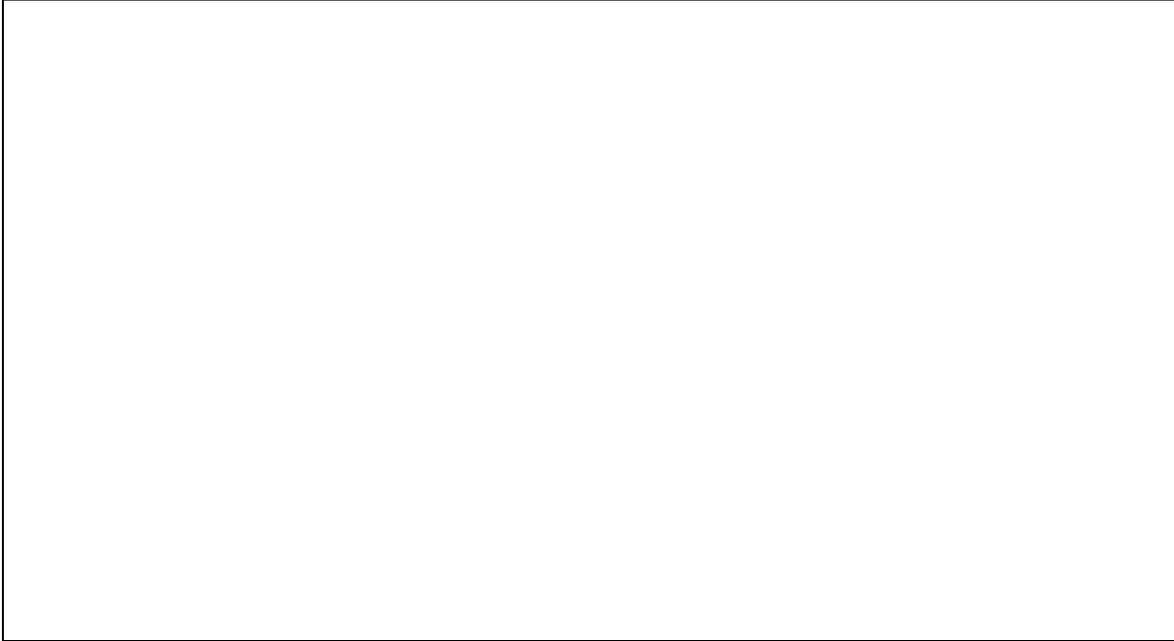
Operator Certification Program Coordinator  
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### Noah Adams

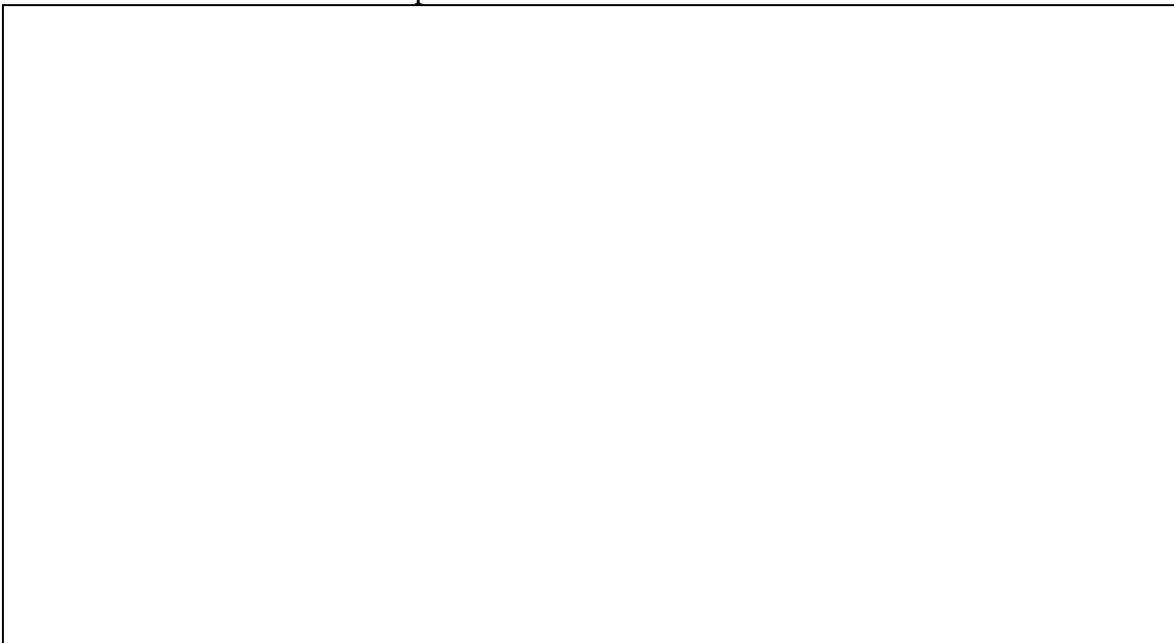
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**Show the math steps taken to reach your answer.** Math conversion sheet can be downloaded at [http://www.abccert.org/testing\\_services/certification\\_study\\_resources.asp](http://www.abccert.org/testing_services/certification_study_resources.asp)

1. A 0.75 MGD system is feeding chlorine at a rate of 14 lbs/day. What will be the resulting chlorine dose?



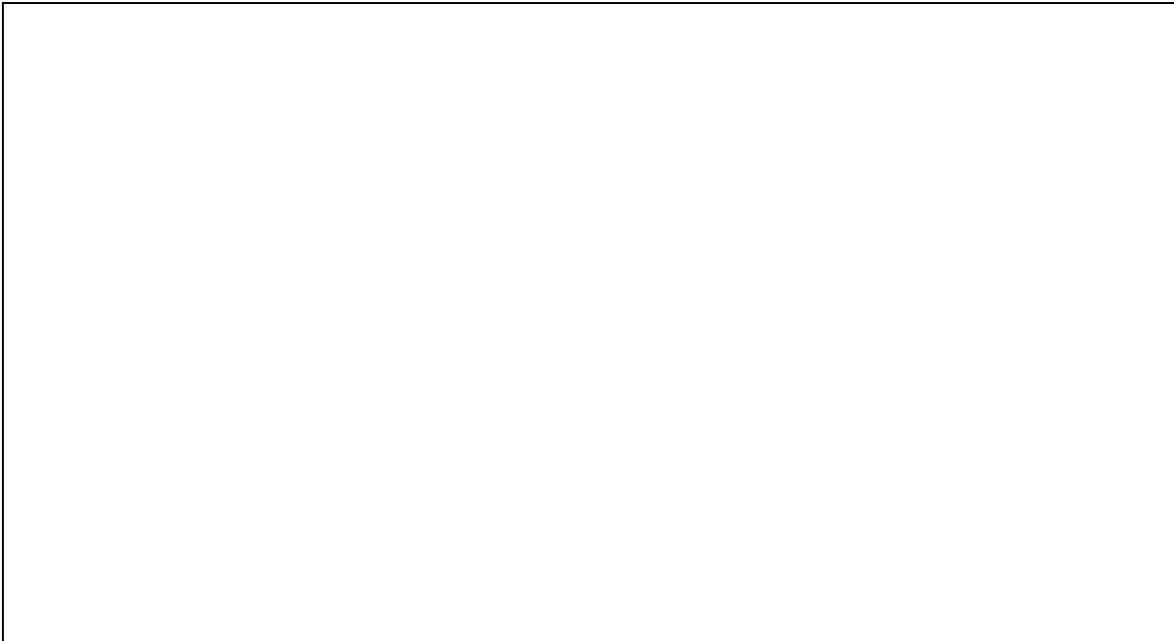
2. Determine the required flow in gal/day for a settling basin that is 20 feet long, 160 inches wide and 1.5 meters deep with a detention time of 180 minutes.



3. Convert 0.85 MGD to GPM.



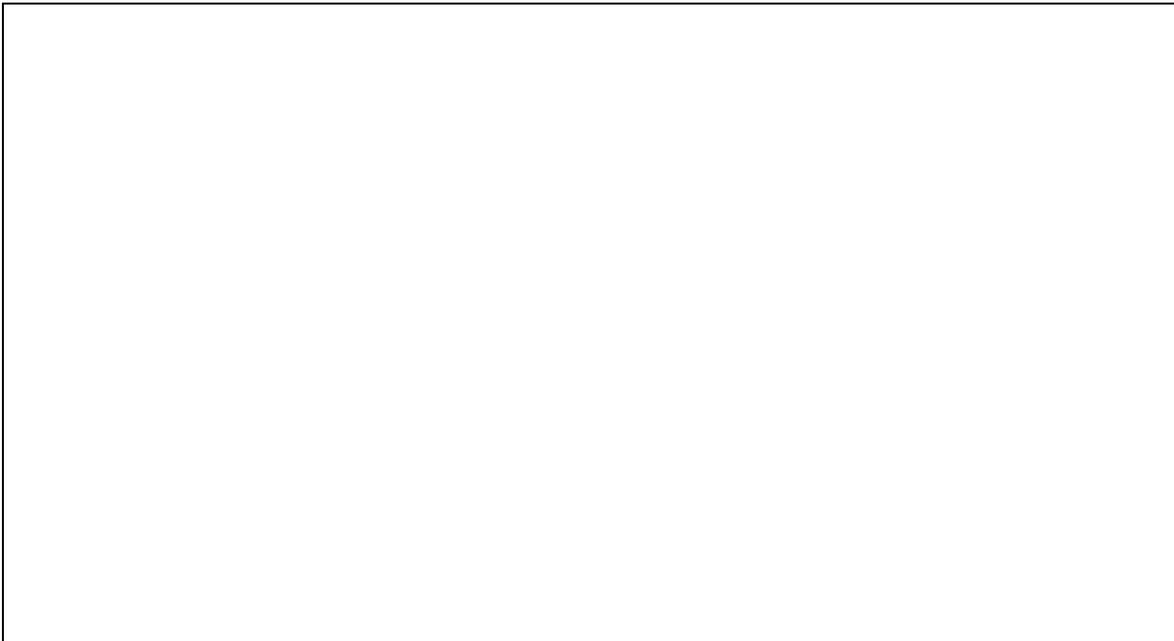
4. If 150 mg/L suspended solids are removed by a trickling filter, how many pounds per day suspended solids are removed when the flow is 3.8 MGD?



5. What is the perimeter of a rectangle with a length of 18.5 feet and a width of 15 feet?



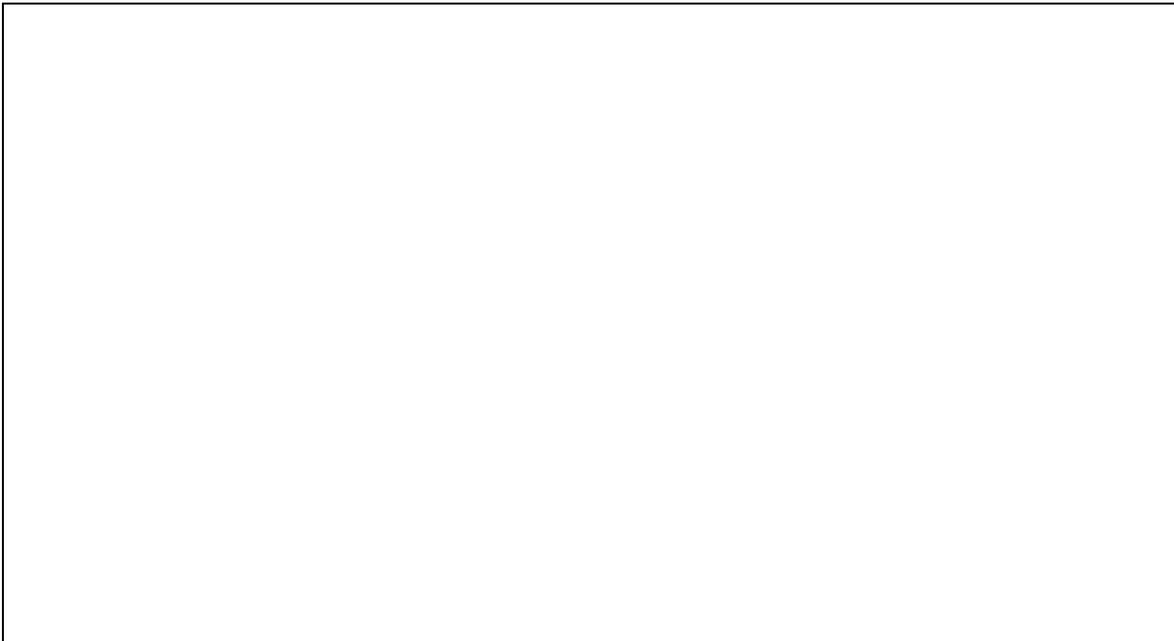
6. Mixed liquor suspended solids (MLSS) is pumped to an aerobic digester. The MLSS is 5,000 mg/L and contains 80% volatile suspended solids. The digester contains solids at 1.82% total solids. Biosolids withdrawn from the digester are 67% volatile solids. What was the percent VSS reduction through the digestion process?



7. Calculate the volume, in gallons, of a circular tank that is 65 feet in diameter and 75 feet tall. The tank is filled to the top with water.



8. How many gallons of water must be added to 25 gallons of 5% hypochlorite solution to produce a 1.25% hypochlorite solution?



9. Your plant is treating 30 million gallons per day and feeding 1,000 lbs of chlorine per day. The chlorine residual is 3.0 mg/L. Calculate the chlorine dose.



10. A belt filter press receives a feed sludge at 3% total solids and produces a cake that is 20% total solids. If the influent flow rate to the press is 50 gpm, what will the volume of cake produced be if the press runs for 10 hours?



**11.** If a water tank has a volume of 2.9 million gallons and the flow from the tank is 4.75 mgd, what is the detention time in hours?



**12.** How many liters are contained in 85 gallons of water?



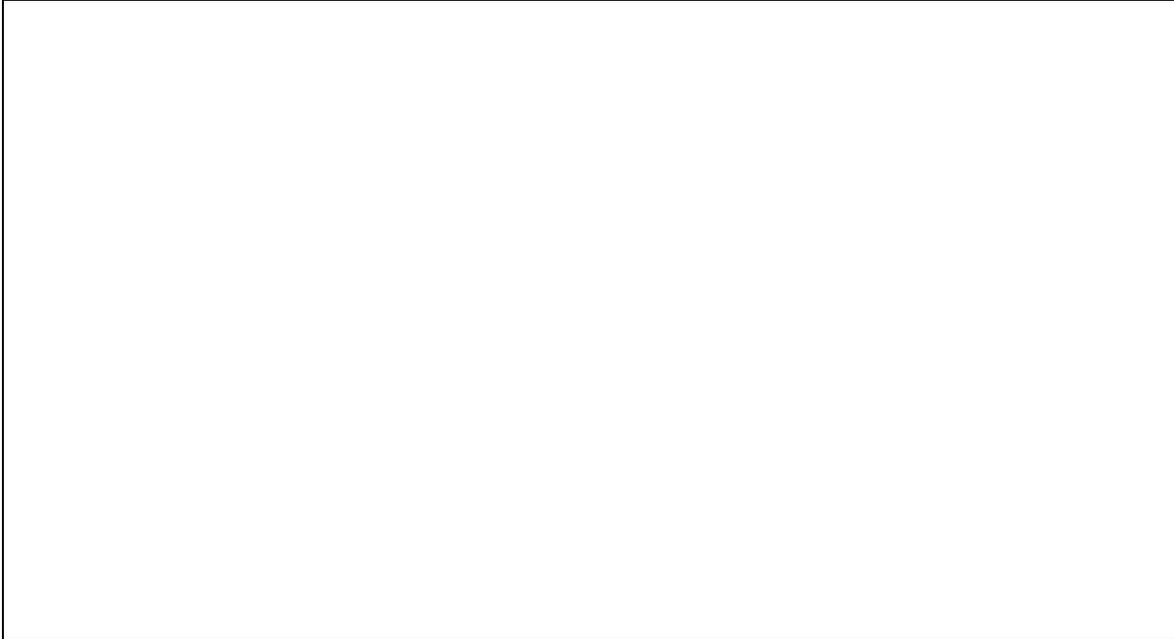
**13.** What is the motor horsepower for a pump with the following parameters?

Motor efficiency: 86%

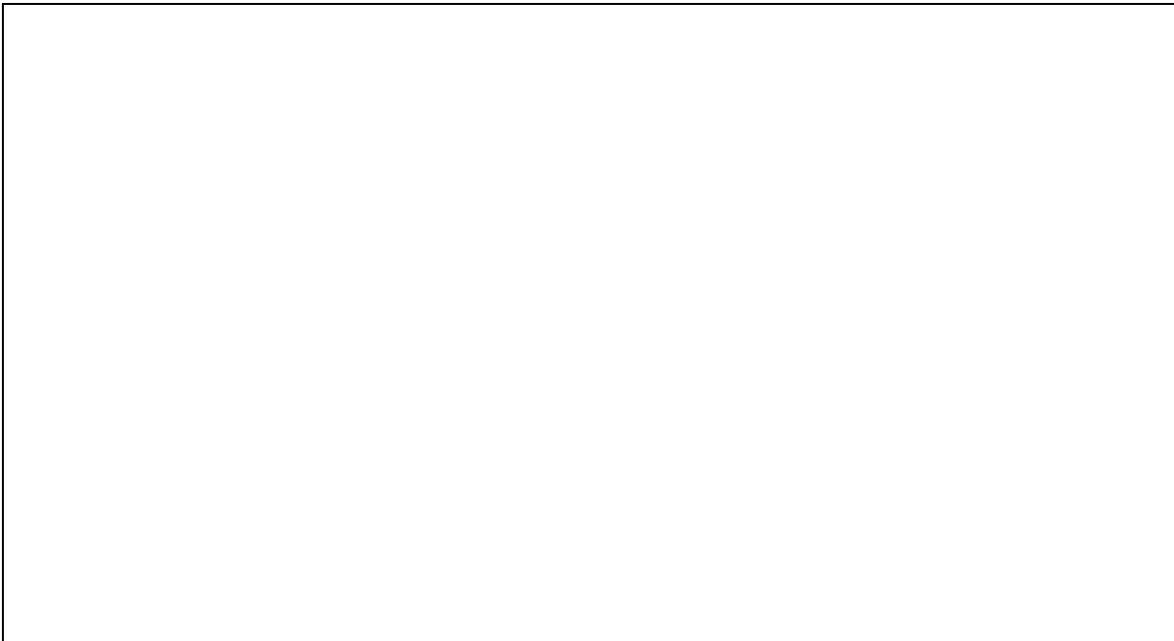
Total head: 145ft

Pump efficiency: 74%

Flow: 1.65 mgd



**14.** Find the drawdown of a well if the well yields 415 gpm and the specific yield is 17.9 gpm/ft.



15. What is the flow through a 10.0 inch diameter pipe if it delivers 865 gpm?

NAME \_\_\_\_\_

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For additional training/PHDs click on the link below. This course provides 16 hours of PDH-approved training for drinking-water operators in the State of Arizona. These are available as individual lessons for credit or as a whole course.

<http://www.waterhelp.org/index.php/client/arizona>