1. A 45-year-old woman is evaluated in the emergency department for the acute onset of dyspnea, wheezing, and progressive respiratory distress. She has a history of severe persistent asthma with two previous admissions to the intensive care unit, one of which required intubation. Her medications are a high-dose inhaled corticosteroid, salmeterol, and as-needed albuterol. She has not responded to aggressive bronchodilation therapy and intravenous corticosteroids. 
   On physical examination, she is in marked distress and is anxious. Temperature is 37.0 °C (98.6 °F), blood pressure is 145/100 mm Hg, pulse rate is 120/min, and respiration rate is 25/min; BMI is 35. Cardiac examination reveals a rapid and regular rhythm with no murmurs. Pulmonary examination reveals very faint wheezing. 
   Arterial blood gas studies breathing ambient air show a PCO₂ of 80 mm Hg (10.6 kPa), a PO₂ of 50 mm Hg (6.7 kPa), and a pH of 7.08. Chest radiograph shows hyperinflation but no infiltrates. She undergoes rapid sequence induction and intubation and is started on mechanical ventilation. 
   Which of the following strategies in establishing ventilator settings is most appropriate? 
   A. Decreased inspiratory flow 
   B. Increased minute ventilation 
   C. Prolonged expiratory time 
   D. Prolonged inspiratory time

2. A 25-year-old woman is admitted to the intensive care unit (ICU) for a 6-hour history of respiratory distress. She has acute lymphoblastic leukemia and received cytotoxic chemotherapy 2 weeks before ICU admission. She has had fever and leukopenia for 7 days. 
   On physical examination, she is in marked respiratory distress. Temperature is 39.0 °C (102.2 °F), blood pressure is 110/70 mm Hg, pulse rate is 130/min, and respiration rate is 42/min. Weight is 50.0 kg (110.2 lb). Ideal body weight is calculated as 50.0 kg (110.2 lb). Acute respiratory distress syndrome is diagnosed. She is intubated and started on mechanical ventilation in the assist/control mode at a rate of 12/min, tidal volume of 300 mL, positive end-expiratory pressure (PEEP) of 5 cm H₂O, and FIO₂ of 1.0. An arterial blood gas study on these settings shows a pH of 7.47, PCO₂ of 30 mm Hg (4.0 kPa), and PO₂ of 45 mm Hg (6.0 kPa). Peak airway pressure is 26 cm H₂O, and the plateau pressure is 24 cm H₂O. 
   Which of the following is the most appropriate treatment to improve oxygenation? 
   A. Increase PEEP to 10cm H₂O 
   B. Increase respiratory rate to 18/min 
   C. Increase tidal volume to 500ml 
   D. Start inhaled nitric oxide
3. A 50-year-old man is evaluated in the intensive care unit for acute respiratory distress syndrome secondary to severe community-acquired pneumonia. He is intubated and placed on mechanical ventilation. He was previously healthy and took no medications before his hospitalization. On physical examination, temperature is 38.3 °C (100.9 °F), blood pressure is 120/60 mm Hg, and pulse rate is 110/min. The patient weighs 60.0 kg (132.3 lb); ideal body weight is 60.0 kg (132.3 lb). He is sedated and is not using accessory muscles to breathe. Central venous pressure is 8 cm H\textsubscript{2}O. Other than tachycardia, cardiac examination is normal. There are bilateral inspiratory crackles. Initial ventilator settings are volume control with a rate of 18/min, a tidal volume of 360 mL, positive end-expiratory pressure (PEEP) of 10 cm H\textsubscript{2}O, an FIO\textsubscript{2} of 0.8, a peak pressure of 34 cm H\textsubscript{2}O, and a plateau pressure of 32 cm H\textsubscript{2}O. Oxygen saturation by pulse oximetry is 96%.

Which of the following is the most appropriate next step in management?
   A. Decrease respiratory rate
   B. Decrease tidal volume
   C. Increase FiO\textsubscript{2}
   D. Increase PEEP

4. A 63-year-old man with acute respiratory distress syndrome (ARDS) is evaluated in the intensive care unit. He has just been intubated and placed on mechanical ventilation for ARDS secondary to aspiration pneumonia. Before intubation, his oxygen saturation was 78% breathing 100% oxygen with a nonrebreather mask. On physical examination, temperature is 37.0 °C (98.6 °F), blood pressure is 150/90 mm Hg, and pulse rate is 108/min. His height is 150 cm (59 in) and his weight is 70.0 kg (154.3 lb). Ideal body weight is calculated to be 52.0 kg (114.6 lb). Central venous pressure is 8 cm H\textsubscript{2}O. Cardiac examination reveals normal heart sounds and no murmurs. Crackles are auscultated in the lower left lung field. The patient is sedated. Neurologic examination is nonfocal. Mechanical ventilation is on the assist/control mode at a rate of 18/min. Positive end-expiratory pressure is 8 cm H\textsubscript{2}O, and FiO\textsubscript{2} is 1.0.

Which of the following is the most appropriate tidal volume?
   A. 300ml
   B. 450ml
   C. 700ml
   D. 840ml