

**Nr identyfikacyjny**   
SP FI – …………… – 2020/2021  
 (numer porządkowy z kodowania)

**Nr identyfikacyjny – wyjaśnienie -** *symbol przedmiotu* np. BI – biologia, *numer porządkowy wynika z numeru stolika wylosowanego przez ucznia*

WOJEWÓDZKI KONKURS PRZEDMIOTOWY   
Z FIZYKI

organizowany przez Łódzkiego Kuratora Oświaty   
dla uczniów szkół podstawowych w roku szkolnym 2020/2021

TEST – ETAP SZKOLNY

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| * Arkusz liczy **12 stron** i zawiera **3 zadania,** w tym brudnopis. * Przed rozpoczęciem pracy sprawdź, czy Twój arkusz jest kompletny. Jeżeli zauważysz usterki, zgłoś je Komisji Konkursowej. * Zadania czytaj uważnie i ze zrozumieniem. * Odpowiedzi wpisuj długopisem bądź piórem, kolorem czarnym lub niebieskim. * Dbaj o czytelność pisma i precyzję odpowiedzi. * W zadaniach zamkniętych zaznacz prawidłową odpowiedź, wstawiając znak X we właściwym miejscu. * Jeżeli się pomylisz, błędne zaznaczenie otocz kółkiem i zaznacz znakiem X inną odpowiedź. * Oceniane będą tylko te odpowiedzi, które umieścisz w miejscu do tego przeznaczonym. * Do każdego numeru zadania podana jest maksymalna liczba punktów możliwa do uzyskania za prawidłową odpowiedź. * Pracuj samodzielnie. Postaraj się udzielić odpowiedzi na wszystkie pytania. * Nie używaj korektora. Jeśli pomylisz w zadaniach otwartych, przekreśl błędną odpowiedź i wpisz poprawną. * Korzystaj tylko z przyborów i materiałów określonych w regulaminie konkursu.   ***Powodzenia!*** | Czas pracy:  **60 min.** |

Imię i nazwisko ucznia

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Wypełnia Komisja Konkursowa po zakończeniu sprawdzenia prac

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|  | Zadanie I (60pkt.) | | | | | | | | | | | | | | | Zadanie II (14 pkt.) | | |
| Zadanie | 1 | 2 | 3 | 4a | 4b | 4c | 4d | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| Punkty możliwe do uzyskania | **5** | **4** | **3** | **3** | **3** | **4** | **4** | **4** | **2** | **4** | **4** | **3** | **10** | **3** | **4** | **5** | **4** | **5** |
| Punkty uzyskane |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

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| Zadanie III (26 pkt.) | | | | | |  |
| 1 | 2 | 3 | 4 | 5 | 6 | Razem |
| **3** | **2** | **4** | **7** | **4** | **6** | **100 pkt.** |
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Podpisy członków komisji sprawdzających prace:

1. (imię i nazwisko)………………………………………..(podpis) 2. (imię i nazwisko)………………………………………..(podpis)

Ruch jest powszechny

Zjawisko ruchu obserwujemy wszędzie wokół nas. Poruszają się planety, zwierzęta, pojazdy i my sami. Dla zdrowia człowieka ruch ma nieocenione znaczenie.

**We wszystkich zadaniach przyjmij do obliczeń przyspieszenie ziemskie g=10 m/s2.**

**Zadanie I.** Sport zawodowy i amatorski **(0- 60 pkt.)**

1. Adam przejechał na rowerze 6 km jadąc na zachód. Następnie skręcił na południe i przejechał 8 km. **Oblicz drogę, jaką przebył Adam oraz ustal jego odległość od punktu startu. Wykonaj rysunek, zaznacz na nim kierunki świata i odległość między punktem końcowym i początkowym Adama.**

(0 - 5 pkt.)

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**Odpowiedź**…………………………………………….

1. **Oblicz średnią prędkość maratończyka, który dystans s = 42,195 km pokonał w czasie t=3 h. Wynik podaj w m/s.** (0 - 4 pkt.)

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**Odpowiedź**…………………………………………….

1. Piechur poruszał się przez 15 min. ruchem jednostajnym z prędkością 1,5 m/s. **Oblicz drogę, jaką pokonał piechur.** (0 - 3 pkt.)

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**Odpowiedź**…………………………………………….

1. Wykres przedstawia zależność prędkości od czasu dla startującego sprinterao masie m=60 kg.



1. **Oblicz przyspieszenie sprintera.** (0 - 3pkt.)

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1. **Oblicz drogę przebytą przez sprintera w czasie pierwszych 4 s ruchu.**

(0 - 3pkt.)

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1. **Oblicz przyrost pędu sprintera w czasie pierwszych 4 s ruchu.**

(0 - 4pkt.)

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1. **Oblicz przyrost energii kinetycznej sprintera w czasie pierwszych 2 s ruchu.**

(0 - 4pkt.)

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**Odpowiedź a)**…………………**b)**………………. **c)**…………………**d)**…………………….

1. Wykres przedstawia zależność prędkości od czasu dla dwóch rowerzystów A i B.

W kolejnych zdaniach opisujących wykresy **zaznacz** **P** - jeśli zdanie jest **prawdziwe** lub **F -**  jeśli jest **fałszywe**. (0 - 4 pkt.)



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| 1. Rowerzysta A pokonał dłuższą drogę niż rowerzysta B | F  P |
| 1. Rowerzysta A w pierwszej części ruchu miał większe przyspieszenie od rowerzysty B. | F  P |
| 1. W drugiej części ruchu rowerzyści poruszali się z opóźnieniem o jednakowej wartości. | F  P |
| 1. Czas ruchu obu rowerzystów był taki sam | F  P |

1. Spadochroniarz z otwartym spadochronem spada ruchem jednostajnym. **W oparciu o znane Ci prawa wyjaśnij w jakiej sytuacji jest to możliwe.**

(0 - 2 pkt.)

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1. Podczas dużego wysiłku sportowiec spocił się i jego włosy „pozlepiały się”. **Podaj nazwę sił, które o tym decydują. Wymień elementy, pomiędzy którymi te siły działają.** (0 - 4 pkt.)

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1. Wykres przedstawia zależność szybkości piłki rzuconej pionowo do góry od czasu trwania jej lotu.



**Odczytaj z wykresu i zapisz:**

1. **szybkość, z jaką wyrzucono piłkę do góry.** (0 - 1 pkt.)

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1. **czas od chwili wyrzucenia piłki do osiągnięcia przez nią maksymalnej wysokości.** (0 - 1 pkt.)

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1. **czas spadania piłki.** (0 - 1 pkt.)

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1. **szybkość, z jaką piłka uderzyła w podłoże.** (0 - 1 pkt.)

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1. **Opisz przemiany energii mechanicznej huśtawki wykonującej ruch wahadłowy.**

(0 – 3pkt.)

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1. Marcin wsiadł na rower i rozpoczął jazdę. Najpierw przez 0,5 min jechał z górki ze stałym przyspieszeniem a=0,1 m/s2. Następnie przez 2 minuty jechał po płaskiej drodze ze stałą prędkością, jaką uzyskał po zjechaniu z górki. **Oblicz średnią szybkość Marcina na całej drodze.** (0 - 10 pkt.)

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**Odpowiedź…………………………………………….**

1. Koła roweru mają promień r =33,5 cm. Prędkość roweru wynosi 4,2 m/s. **Oblicz częstotliwość obrotu koła roweru.** (0 - 3pkt.)

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**Odpowiedź…………………………………………….**

1. Ciężarowiec podniósł sztangę o masie 150 kg z pomostu na wysokość h=2,2 m. **Oblicz moc ciężarowca**, jeżeli czas podnoszenia sztangi wyniósł t=3s.

(0 - 4 pkt.)

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**Odpowiedź…………………………………………….**

**Zadanie II.** Ruch w przyrodzie **(0- 14 pkt.)**

1. Średnia prędkość lotu sikorki bogatki wynosi 8 m/s. Teren jaki oblatuje sikorka to 4 km2. Załóż, że teren sikorki jest kwadratem. **Oblicz ile czasu zająłby sikorce lot wzdłuż krawędzi tego terenu.**

(0 - 5 pkt.)

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**Odpowiedź**…………………………………………….

1. Jastrząb o masie m=1,5 kg leci z prędkością v=50 m/s na wysokości h=100 m nad powierzchnią łąki. **Oblicz całkowitą energię mechaniczną jastrzębia.**

(0 - 4 pkt.)

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**Odpowiedź**…………………………………………….

1. Koń ciągnie wóz siłą F = 600 N. Prędkość konia z wozem jest stała i wynosi

v=1,25 m/s. **Oblicz moc tego konia.**

(0 - 5 pkt.)

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**Odpowiedź**…………………………………………….

**Zadanie III.** Zmierz się z ruchem **(0- 26 pkt.)**

1. Uczniowie podzieleni na trzy grupy zmierzyli długość boiska do piłki siatkowej. Pomiary zapisali w tabeli:

|  |  |
| --- | --- |
| **Nr pomiaru** | **Długość boiska**  **(m)** |
| 1 | 17,99 |
| 2 | 18,02 |
| 3 | 17,97 |

**Oblicz długość boiska. Wynik zapisz z niepewnością pomiaru.**

(0 - 3 pkt.)

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**Odpowiedź**…………………………………………….

1. **Oblicz wartość siły F2, którą należy przyłożyć do dźwigni dwustronnej, aby pozostała w równowadze**. (0 - 2 pkt.)



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**Odpowiedź**…………………………………………….

1. Uczniowie wyznaczali przyspieszenie wózka o stałej masie m1 pod działaniem sił o różnych wartościach. Następnie powtórzyli doświadczenie z wózkiem o stałej masie m2. Wyniki pomiarów przedstawili na wykresie zależności przyspieszenia ciała od działającej na nie siły.



* 1. **Posługując się wykresem ustal, który z wózków ma większą masę. Odpowiedź uzasadnij.** (0 - 2 pkt.)

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* 1. **Na wykresie powyżej naszkicuj wykres dla masy m3 większej zarówno od masy m1 jak i od m2. Zapisz jednym słowem, w jaki sposób zmienia się kąt nachylenia wykresu α jeśli masa wózka rośnie.** (0 - 2 pkt.)

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1. Uczeń upuścił gumową piłeczkę z wysokości h1=120 cm. Piłeczka uderzyła w podłogę i odbiła się. Po odbiciu wzniosła się na wysokość h2=90 cm. **Oblicz, jaką część całkowitej energii mechanicznej straciła piłeczka w zderzeniu z podłogą.**

(0 - 7 pkt.)

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**Odpowiedź**…………………………………………….

1. Masz do dyspozycji: wagę, wodę, cylinder z podziałką oraz tabelę gęstości metali. Na wyścigach kolarskich zdobyłeś złoty medal. **Wymień kolejne czynności i zapisz obliczenia jakie należy wykonać, aby sprawdzić czy medal jest wykonany ze złota.**

(0-4 pkt)

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1. Masz do dyspozycji: ławkę, równię pochyłą o wysokości h, samochodzik, metrową linijkę. Z części przyrządów zbudowałeś układ pomiarowy jak na rys.



Z wysokości h puszczamy samochodzik, który zatrzymuje się po przebyciu poziomej drogi s. **Zapisz obliczenia jakie należy wykonać w celu wyznaczenia współczynnika tarcia kół samochodziku o ławkę (poziomą powierzchnię. Wymień wielkości fizyczne, które należy zmierzyć, aby obliczyć współczynnik tarcia.**

(0-6 pkt)

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